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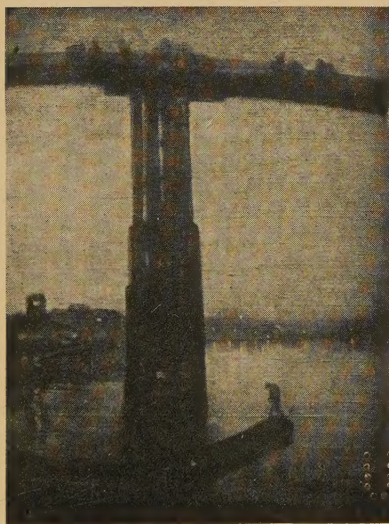
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THE CHILDREN'S BOOK OF CELEBRATED BRIDGES

BY

LORINDA MUNSON BRYANT

*Author of "The Children's Book of Celebrated Pictures," "The Children's
Book of Celebrated Sculpture," "The Children's Book of
Celebrated Buildings," etc.*



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To my friend

RUTGER BLEECKER JEWETT

WHO PUBLISHED MY FIRST BOOK

HE DEFEATED TIME AND

GAVE ME A VISION OF WORK

UNLIMITED BY MEASURE OF DAYS

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Dear Children:

Of all the fairies we meet in this workaday world of ours, none has been less understood than the water-sprite. This is one reason why bridge-building has always been such a problem. You see, the water-sprites, sometimes called Kelpies and sometimes Nixies, are as old as the world itself. Of course we know to-day that these invisible little workers really stood for Nature's laws, which are God's laws, and all down the ages no bridge-builder has been so foolish as knowingly to ignore these laws.

Many times, however, disaster came because the builders did not understand the invisible power. Strange legends still cling to celebrated bridges where it was believed that spiteful sprites caused trouble: for example, the Devil's Bridge at Andermatt and the Auld Brig at Ayr.

As we journey around the world and cross its bridges of stone, wood, iron, and wire, we shall find that the bridge-builders usually have obeyed Nature's laws. To learn these laws they have studied in various countries the formation of the rocks, the character of the soil, the sources of the rivers, and the kinds of weather to be expected at different seasons, or the bridges never could have endured.

We are very grateful to the bridge engineers for the safe, durable, and beautiful structures which they have thrown across the rivers, lakes, and ravines for us, and we say, God bless them for making possible the splendid roadways of all lands!

Love and best wishes from your friend,

LORINDA MUNSON BRYANT.

CELEBRATED BRIDGES

THE RIALTO BRIDGE, VENICE

THE Rialto! Just the word brings visions of the lovely arch stretching above the glistening water of the Grand Canal; the gay crowd ascending and descending the broad, flat steps; the brilliant shops hung with many-colored tapestries and sparkling with jewels.

A short time before the present bridge was built (1588-92) King Henry III of France, while visiting in Venice, stole away from his courtiers, to shop by himself. Of course he was attracted by the gay scene on the Rialto and naturally stopped at the sign of the "Old Woman on the Bridge," with its display of exquisite jewels. At once the glitter of a gorgeously carved gold scepter caught his eye. The price, the jeweler stated, was twenty-six thousand ducats—sixty thousand dollars. An outrageous price! But King Henry wanted it and ordered it sent to his hotel, the Foscari Palace. The jewelers on the Ponte di Rialto to-day are still looking for the money-kings to pay what they ask for their wares.

The Rialto bridge was designed by Giovanni Contino, nicknamed "da Ponte"—*ponte* being the Italian word for "bridge." We regret exceedingly that the doge Andrea Gritti did not accept the plan offered by Michelangelo fifty years earlier. A picture of the great sculptor's bridge-plan is in the Casa Buonarroti, in Florence.

The marble arch of the Rialto bridge rests on a foundation of twelve thousand piles driven to a depth of sixteen feet on the banks of the canal. It took the place of a wooden bridge which until 1854 was the only link connecting the innumerable east and west islands on which the city of Venice is built. All the section around the bridge is the Rialto. The Venetians called the bridge Ponte di Rialto from *Rivoalto*, deep stream or river, because at this point in the ancient city the canal was unusually deep. It was this quarter of the city, not just the bridge, which Shakspeare had in mind when he made Shylock say:

Signior Antonio, many a time and oft
In the Rialto you have rated me,
About my moneys . . .



Courtesy of Pratt Institute

FIG. 1. THE RIALTO BRIDGE, VENICE

LONDON BRIDGE, ENGLAND

WHO does not know that old, old game which is ever new—

London Bridge is falling down,
Falling down! falling down!

But London Bridge has not fallen down—at least not for nearly a century.

The history of London Bridge, across the river Thames, is the story of England. The story began with a wooden bridge in Roman and Saxon times. But flood and fire were its constant enemies. Henry II in 1176 ordered a stone bridge built, with a platform nearly a thousand feet long and forty feet wide. Very soon houses grew up along the sides of the bridge, with a Gothic chapel in the middle and gate-houses at the ends of the bridge. The structure now looked like a street floating on the water. So beautiful was this picturesque street in Queen Elizabeth's day (1558–1603) that "as fine as London Bridge" became a well-known simile.

Even a Lord Mayor of London lived in one of the houses on the bridge. It is said that his daughter found her husband by falling into the river. The young man, the Lord Mayor's apprentice, was Edward Osborne, a forebear of the present Duke of Leeds. Alas, gruesome things happened here, too! Many a traitor's head decorated the gates as a warning to wrong-doers.

The stone London Bridge withstood the destructive river floods of seven hundred years, the great fire of 1666, and the ice jam of 1683.

When hoary Thames with frozen osiers crown'd,
Was three long moons in icy fetters bound.

At last, however, in 1831, the old stone bridge gave place to the London Bridge of to-day. The stone London Bridge now lives as a memory of past glory.

Our London Bridge, designed by Sir John Rennie (1761–1821) and built by his sons, was opened with great pomp by King William IV and Queen Adelaide in 1831. The bridge is beautiful in structure, supported as it is by five semi-elliptical masonry arches—a wide central arch flanked with two smaller ones—and resting on round stone piers sunk deep in the river. Over its broad roadway passes and repasses every nation under heaven while the sun is circling the globe. London Bridge still feels the heartbeat of every being gathered in her grand old city.



FIG. 2. LONDON BRIDGE, ENGLAND

HELL GATE BRIDGE, NEW YORK CITY

NEW YORK City is founded on a rock. This rock is the tip end of a promontory projecting into New York Bay. On the west is the Hudson River coming three hundred and fifty miles from the northwest. And on the east is a short strait, called the East River, which connects Long Island Sound with the bay.

In the early days, sailors, guiding ships into New York Harbor, found, when rounding Ward's Island in the East River, a swirling rush of water which, if it caught their boat, carried them to sudden death on the rocks in the whirlpool or whorl-gate. This "whorl-gate" became "hell-gate" to these sailors—and, of course, when a bridge was thrown across the stream at that point it was called Hell Gate Bridge.

Thirty years and more ago engineers began blasting the rocks to deepen the East River channel. Great Mill Rock, however, was left, to prevent eddying of the waters from the Harlem and East rivers, meeting at this point.

Hell Gate Bridge was begun in 1912. For five long years the work dragged on; then a spiritual bomb struck the United States With a rush and a bound Hell Gate Bridge was finished and ready for use when we entered the World War in 1918, and was the connecting rail link, for through trains, between Boston and Washington, D. C. It is a railroad bridge and the only great bridge connecting New York City's boroughs which is not owned by the city.

Coming into New York City over the many railroads—most of which run into two great stations—is like working out a Chinese puzzle. Trains from the east entering the city by Hell Gate Bridge first cross a long trestlework over Sunken Meadow and Randall Island, a bridge over Little Hell Gate to another high trestle across Ward's Island, and then to Long Island over Hell Gate Bridge. The picturesque arch of this bridge, spanning a thousand feet, the longest ever projected, clears the high-water mark two hundred and forty feet. The towers of red granite on gray granite bases, like giant sentinels standing guard, are as solid as the eternal rocks to which they are anchored.



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FIG. 3. HELL GATE BRIDGE, NEW YORK CITY

THE ELBE BRIDGE, DRESDEN

THERE are five bridges across the river Elbe, in Dresden. The central one, Augustusbrücke, with its fifteen arches, was built in 1906 to replace a narrower old one which had done service for nearly two hundred years. The new bridge is a quarter of a mile long. The most noted buildings in Dresden are on the river near the famous Augustusbrücke. The Georgenschloss, the palace of Duke George, built in 1530-35, was rebuilt at the beginning of the twentieth century. The street running beneath the royal palace, the Georgentor, leads direct to this central bridge.

Probably no city in Germany, unless it is old Nuremberg, thrills us as does Dresden, because in it are many of the masterpieces of the great artists. This fact prompted the poet Herder to name Dresden "the German Florence." Among the world paintings there are Raphael's Sistine Madonna, Titian's "Tribute Money," and Correggio's "Holy Night."

The river Elbe has a rather curious natural history. It rises nearly five thousand feet above sea-level, but its drop is so rapid that by the time the stream reaches Dresden it has only two hundred and eighty feet to fall and is still four hundred and eighty miles from its mouth at Cuxhaven on the North Sea. You can readily understand that with this slight fall the river naturally deposits large quantities of sand and silt along its course, until at Hamburg navigation is most difficult. Quite two hundred miles, or nearly a third of its length, is not navigable without the greatest effort to keep the channel open. This of itself has made the Elbe most important, for each city is determined to outdo the other in keeping the river dredged.



FIG. 4. THE ELBE BRIDGE, DRESDEN

GALATA BRIDGE, CONSTANTINOPLE

TO understand the waters around Constantinople is like solving a puzzle. Look at your map. From the Ægean Sea we enter the little Sea of Marmora. At our left is Stamboul, meaning "into the city," the Turkish name for Constantinople. The waters of the Bosphorus, the strait dividing Europe from Asia, mingle at the Galata Bridge with those of the beautiful harbor known as the Golden Horn. This bridge unites Stamboul, the Mohammedan section, and Galata-Pera, the European section of the city. Sailing around Seraglio Point into the harbor, we see the Galata Bridge on our left and on the right the coast of Asia, with the little town of Scutari creeping to the water's edge. In the foreground is the very building where Florence Nightingale nursed the soldiers during the Crimean War.

We dock at Pera, the modern section where the Europeans and Americans live. Now study the picture taken from Pera, looking south to Stamboul. On the left in Stamboul is the famous mosque of St. Sophia. The Sea of Marmora is in the distance beyond. A thousand and more minarets rise from the mosques of the city and the cry of the muezzin is heard far and wide, calling, "Come to prayer!"

As we stand on the Galata Bridge we seem to watch all nationalities meeting and passing. No other spot on the globe offers such a scene. The meeting-place of East and West; and just a meeting-place! One thing is certain—that while Constantinople is the key to Asia, the key has never unlocked Asia to the Occident.

This place, so big with world happenings, has many legends clinging to it. The name Bosphorus, meaning "ox-ford," came in this wise. The great god Jupiter was everlastingly falling in love with pretty faces, and his wife, Juno, was everlastingly jealous. Io was his latest love. One day a heavy cloud suddenly darkened the sky. Juno brushed aside the cloud, but saw only Jupiter with a lovely heifer on the bank of a river. Poor Io! Juno begged for the heifer, then put her under the care of the hundred-eyed Argus, who slept with an eye open. Mercury, sent to rescue Io, at last put all of Argus's eyes to sleep and cut off his head. Juno then sent a gadfly to torment Io. To escape, Io swam across the Bosphorus, called the ox-ford ever since.



FIG. 5. GALATA BRIDGE, CONSTANTINOPLE

THE GREAT STONE BRIDGE, ROUEN

BRIDGES inspire artists; architects beautify them with towers and arches; sculptors ornament them with statues, and painters decorate their interiors with pictures. When Camille Pissarro, the modern French master (1831-1903), painted the picture of the "Great Stone Bridge, Rouen," he opened our eyes to the human side of bridges. Sturdy and strong, this bridge over the Seine stands very close to the factories. The straight columns of smoke and steam tell of human beings having work—WORK!—that great blessing to man and woman. The feel of the river front, where traffic is heavy and trade is brisk, is in the picture. The artist himself might be in one of the small boats nosing the shore.

There are three bridges across the Seine at Rouen, and also a curious moving platform called a transporter bridge. The platform, hung between two lofty towers and run by electricity, crosses and recrosses as it empties and takes on freight, men, animals, and wagons in its continuous journey. Duluth, Minnesota, has a transporter bridge.

Sea navigation begins on the Seine at Rouen. Her quay, extending a mile and a half along the river, rivals even that of Paris. So crooked is the Seine,—which nearly doubles itself from Paris to Havre, the seaport,—that it is very confusing as to which way one is going. During the Franco-German War (1870-71) a French general started from Paris with his troops, to attack the besiegers. They crossed the Seine and after an hour or so came to a river. He called his aide and asked:

"What river is this?"

"The Seine, General," the aide answered.

"Great heavens! Then we are retreating," the general cried in alarm.

The city of Rouen, full of French history from the fourth century down, has to its everlasting shame the trial and burning of Joan of Arc. Her death was a disgrace not only to Rouen but to the French and English peoples, who stood by and sanctioned it.



FIG. 6. THE GREAT STONE BRIDGE, ROUEN

THE BRIDGE OF BOATS, COLOGNE

THREE celebrated rivers in Europe, the Rhine, the Rhone (see page 30), and the Danube (see page 48), rise within a few miles of one another in the mountains of Switzerland. They flow north, south, and east. Three celebrated cities on these rivers all became important in history about the first century A. D. Naturally, how to cross these rivers was the first problem. Rowboats were too slow, but rowboats fastened together side by side, and supporting a plank roadway, made a bridge so useful that from Julius Cæsar's time until to-day the "bridge of boats" has been in demand.

The Bridge of Boats in Cologne sways with the rise and fall of the Rhine as it did two thousand years ago. When Cæsar was moving his army across the river, his Commentaries say, "... although the greatest difficulty in forming a bridge was presented to him on account of the breadth, rapidity and depth of the river . . . he built a pile bridge in ten days." The sight of Cæsar's soldiers quieted the country, and Cæsar returned to Gaul after having cut down the bridge.

Cologne got its name from Colonia Agrippina, a Roman colony founded here in 51 A.D. In 308 Constantine built a stone bridge over the Rhine, which stood for six centuries. The history of Cologne is full of legends. When the plague of 1357 was at its height, Richmonde, the wife of the knight Mengis, fell into a death-like swoon and was buried in the Apostles Church. A thieving grave-digger, trying to steal the ring from her finger, roused her from the swoon. When Mengis saw his wife alive again, he swore she was a vision and said he would sooner believe his horses could mount to the loft of his house than that his wife could come to life. At once he heard the hoofs of his horses on the stair and their heads appeared at the loft window. To-day two horses' heads, fixed on the house with the tower near the Bridge of Boats, suggest the horses of the legend.

You might learn Coleridge's (1772-1834) quaint poem to recite while we cross the Bridge of Boats in Cologne.

The river Rhine, it is well known,
Doth wash your city of Cologne;
But tell me, nymphs! what power divine
Shall henceforth wash the river Rhine?



FIG. 7. THE BRIDGE OF BOATS, COLOGNE

POUGHKEEPSIE BRIDGE, NEW YORK

NO waterway in America is older than the Hudson River, and no waterway flows through a tougher, harder, or more twisted fault of rocks. The struggle which ended in breaking the stubborn material of these rocks went on for æons of time. Then suddenly appeared the Palisades, that picturesque huge fence with its broken palings high above the water. No wonder that the Hudson River attracted the early settlers and that cities and towns grew up along its bank.

But no bridge crossed the Hudson River between New York City and Albany. Something must be done. There were the great coal-fields of Pennsylvania on the west and Boston on the east, with all the growing towns between, and no continuous route except through New York City south and Albany north, one hundred and forty miles apart.

After many conferences of wise men, Poughkeepsie was selected as the most practical point for a bridge. Then, too, the Hudson River at this point was narrow and fifty feet deep, with a rocky bottom. The bluffs on each bank, rising more than a hundred feet above the water, are a wonderful foundation for the towers and anchorage. The bridge itself, one hundred and thirty feet above the high-water mark, clears the tallest mast of a ship. The bridge is a cantilever with five river spans and two shore ones. The total length, including shore approach, is nearly a mile and a quarter. It took twenty years to build the Poughkeepsie Bridge (1866-87). A long time, before the actual construction began, was required to convince the public of its usefulness. But when it was finished and railroad traffic began to move over the shorter route, it proved itself a public benefit.

Long strides have been made since then in bridge-building in America. Not only have utility and safety reached comparative perfection in construction, but *art* is entering into every bridge problem. ART is the one element in life not bound by style, time, or peoples. It has a universal appeal. What could be more permanent than a bridge, which is useful, safe, and artistic—a triangle of living qualities?

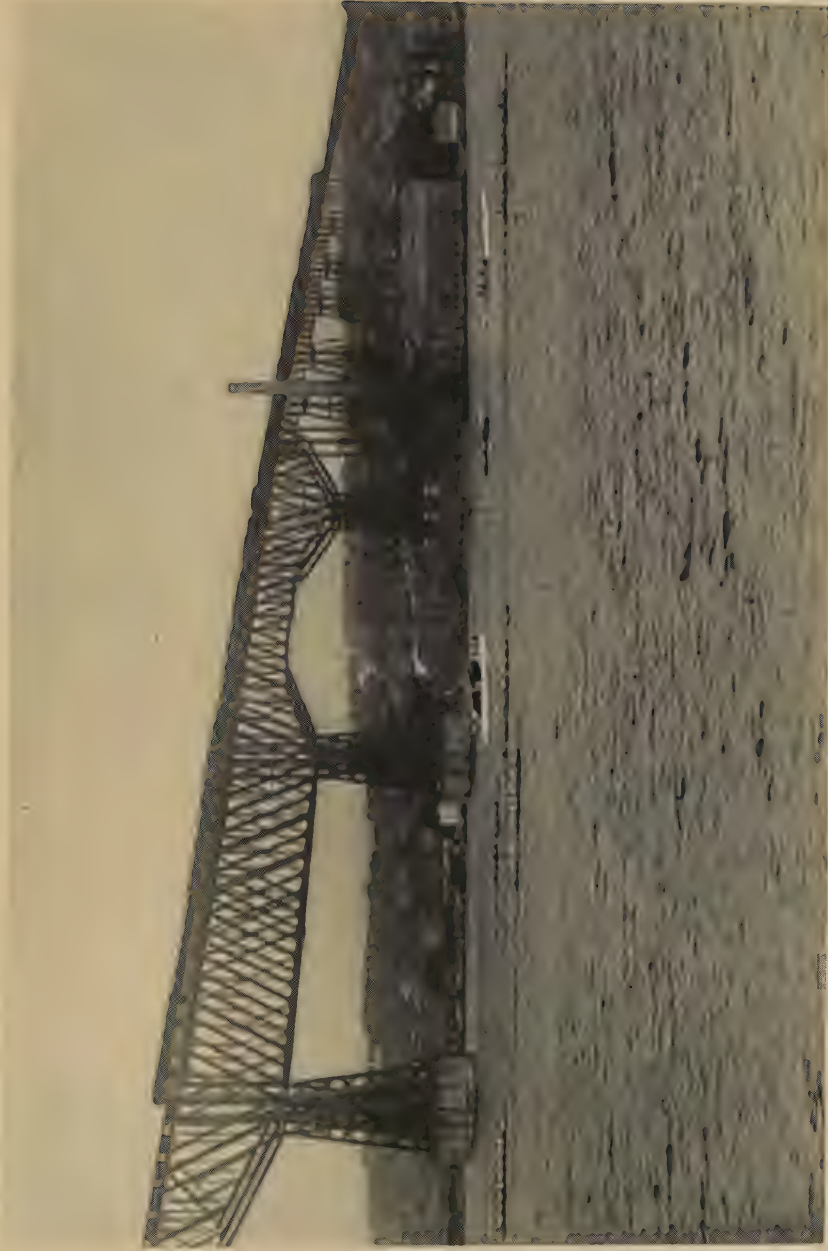


FIG. 8. POUGHKEEPSIE BRIDGE, NEW YORK

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KAPELLBRÜCKE, LUCERNE

THE Chapel Bridge at Lucerne was built in the Middle Ages. It spans the river Reuss not far from where its waters rush like a torrent from the Lake of Lucerne. The bridge-builder probably reasoned that an S-shaped bridge would resist the swift current; and time has proved his wisdom.

Connected with the bridge, in mid-stream, is the old Wasserthurm, a tower that tradition says was once a lighthouse (*lucerna*, an oil-lamp) and probably gave Lucerne its name.

On the wooden ceiling of the covered Chapel Bridge is a set of pictures, painted about two hundred years ago, which show scenes from the history of Lucerne and two of her patron saints. The story of St. Maurice and the Theban Legion, one of the oldest legends of saints, is so full of homely truth that it seems true.

Maurice, meaning "A Moor," was born 286 A. D. His saint's day is September 22. The Theban Legion was a company of 6666 Christian men appointed in Thebes, Egypt, with Maurice, who was high-born, as commander. From the beginning the Theban Legion was so faithful and showed such valor that it was called "Felix" (happy, fortunate). Under the order of Emperor Maximian St. Maurice led his legion into Gaul, where part of the legion went to the Rhine valley and St. Maurice, with the rest, settled on Lake Geneva. And now Maximian had the Theban Legion completely in his power. But when he told Maurice that the purpose of the expedition was to kill the Christians, the Theban Legion refused to fight. St. Maurice pleaded with the emperor, saying: "O Cæsar! we are thy soldiers, but we are also soldiers of Jesus Christ. From thee we receive our pay, but from Him we receive Eternal Life. We are ready to follow thee against the barbarians, but we are also ready to suffer death rather than renounce our faith or fight against our brethren." Cæsar ordered the whole legion put to death.

The men of the Theban Legion were all killed, but the spirit of the legion lives to-day. As we walk through the Chapel Bridge and follow the story pictured so vividly above us we, too, feel something of the courage of those early Christians.



FIG. 9. KAPELBRÜCKE, LUCERNE

VICTORIA BRIDGE, MONTREAL

IN 1860 the Prince of Wales, afterward Edward VII, formally opened the magnificent Victoria Bridge over the river St. Lawrence at Montreal. The building of this bridge, the final lap of the two thousand miles of Grand Trunk Railroad, was started in 1855. Great preparations were under way and the air was full of excitement over the coming of Prince Edward. Two critical historical events, of two great nations,—our Civil War and Canada's completed transportation system,—were in mind, one to free millions of souls, the other to bind Canada to the United States in a closer brotherhood.

Prince Edward came amid great rejoicing. The banquet spread in the mouth of the bridge at the formal opening was, to say the least, unique. The entire city of Montreal seemed gathered at the bridge as the center and radiating out until human eyes refused to pierce the distance. When the golden spike was driven by Prince Edward a great cheer went up from the vast multitude that must have reached London. It would if radio had then been in use.

Six hundred guests sat down to the banquet table spread out in the huge banqueting hall—Victoria Bridge—with the great waters of the St. Lawrence flowing beneath. An eye-witness tells us that a speech was expected from the prince. He arose and said, "I propose the health of the Governor-General, success to Canada, and prosperity to the Grand Trunk Railway," and sat down.

Victoria Bridge was built right over the old tubular one-track bridge. As the work went on, the roof of the old bridge was removed bit by bit, to give air and light. A small boy, watching the work go forward, to get nearer to the scene of action slipped into the old tube without being seen, when he was suddenly caught in darkness, steam, and smoke that nearly smothered him. The authorities said the whole roof must come off at once or work could not continue. Victoria Bridge has two railroad tracks, a traffic road, and a footpath.

In 1814 the tubular bridge was finished with a golden bolt driven in by the Duke of Kent, the grandfather of Edward, Prince of Wales. That bridge first united the railroad systems of Canada and the United States.



Courtesy of Arthur B. MacFarlane

FIG. 10. VICTORIA BRIDGE, MONTREAL

THE CAUSEWAY, BERMUDA

BERMUDA is one of those curious places where water is harvested, building-stones are cut with a cross-cut saw, rain leaves no dampness, and cemeteries are on top of the ground; where there are no rivers, no springs, no crawling bugs, no frost, no snow, no automobiles, trains, nor factories; and Bermuda is the Paradise of the earth.

The coral islands known as the Bermudas—some three hundred and sixty of them, five hundred miles from the United States and six hundred from Europe—are surrounded by water. Bridges, varying in form from stepping-stones to the great Causeway, bind the islands into one of England's strongholds. Until about fifty years ago St. George's Island rose in solitary grandeur like a stupendous tower, having no communication with the main island except by boat—a lovely sail across the narrow entrance on the north. But when the northerly gales struck the islands and heavy swells rushed in, no boat could stem such a tide and all communication stopped.

The Causeway was begun in 1867. It runs east and west, from Hamilton to Long Bird Island. Across the latter for nearly two miles is a solid stone roadway, its foundation sunk deep in the porous limestone rock. This roadway is smooth like polished mahogany and, as Mark Twain says of the Bermuda house, "It is exactly the white of the icing of a cake and has the same unemphasized and scarcely perceptible polish." The iron swing bridge, one hundred and twenty-three feet long, was made in England and brought to Bermuda in pieces. It revolves on a central stone pier. When the bridge is swung it opens two fifty-foot waterways.

One evening I went down to the rocky coast, from the St. George Hotel, to watch the sun drop into the Atlantic. I saw a solitary half-grown colored boy sitting on a jagged rock, fishing. "Are you lonesome here?" I asked him. He looked up and I saw his white teeth gleam. "No, madame," he answered. "I have come home from New York. I was so lonesome for this rock and the ocean and the sun going to bed in the water." Then he added, thoughtfully, "My father always fished from this rock."



FIG. 11. THE CAUSEWAY, BERMUDA

AULD BRIG, AYR, SCOTLAND

A HOT dispute went on in Ayr when the authorities decided to build the "New Brig." The bridge, designed by Robert Adam, was built in 1787-88. Word got abroad in Ayr that the Auld Brig boasted over the new-comer in a taunting tone, saying:

But gin ye be a brig as auld as me—
Tho', faith! that date, I doubt, ye 'll never see!

We know that it is true that the Auld Brig really did speak up to the upstart, for Robert Burns says so. The bard left his bed one night and went down to the river. "When lo! on either hand" he heard "whistling wings" and saw "Two dusky forms dart thro' the midnight air." They parted. The one with wrinkled face settled on the Auld Brig. The other, in a "braw new coat," fluttered over the rising piers, and Bobbie Burns knew they were the sprites of the Brigs of Ayr.

Then began a dialogue of hot words between the Auld Brig of 1250 and the New Brig of 1788. Said the old-timer:

Conceited gowk! puff'd up wi' windy pride!
This mony a year I've stood the flood and tide.

And the new bridge shouted:

Auld Vandal! ye but show your little mense,
Just much about it wi' your scanty sense;
Will your poor narrow foot-path of a street,
Where twa wheel-barrows tremble when they meet—

But, hist! there comes a fairy train dancing on the water! There appears the Genius of the Stream, "a venerable chief," his head crowned with water-lilies, and following him the seasons: Spring hand in hand with Beauty, fervid-eyed; Summer and yellow Autumn, followed quickly by hoary Winter and Hospitality, Courage, and Benevolence, until our sprites of the Brigs of Ayr forget their kindling wrath.

Auld Brig did have its boast partly fulfilled, for in 1877 the New Brig was all but destroyed by floods. It cost nearly sixty thousand dollars to put it in order. In 1881 it was again repaired. The Auld Brig stands to-day inviting us to cross on its "formless bulk o' stane an' lime." What care we if New Brig did taunt you with ". . . sic an ugly Gothic hulk as you"! We are not so sure that you are ugly!



Courtesy of Fitch C. Bryant

FIG. 12. AULD BRIG, AYR, SCOTLAND

THE KISSING BRIDGE, DEPOSIT

WHAT is a "kissing-bridge"? There were thousands of them in America a few years ago. Now only a score or more are left. These bridges, for ox-carts, two-horse wagons, and walkers, crossed rivers, creeks, and canals in every section. The style was always the same—just a means to get across a stream. How stupid! The abutments and piers from neighborhood stone quarries, and floor planks, siding, and roofs from trees on the old farm, were the materials used. The bridge was dark, hollow-sounding, and spooky. No wonder couples must sit close and drive slowly. (Now you know why they were called "kissing-bridges"!)

This particular kissing-bridge spans the Delaware River at Deposit, New York. What a name—Deposit—for a town! A bit of history, as ancient as the earth, explains it. When the Delaware River began its journey southward, the Alleghany Mountains obstructed its course. The river, nothing daunted, ate its way through to the sea. It changed its course often, ever seeking the softest rock. At Deposit it made a right-angle turn and was off again on its journey.

Finally, after many geologic ages, man appeared and settled along the river. He cut down the forests and floated the logs down the stream. All went well until its waters turned a corner, when the logs tumbled over one another pell-mell and were deposited on the land. The town of Deposit then began. The bridge is just above the angle in the river.

Quaint legends cling to the old covered bridges; and superstition still has its grip on us when we face these mysterious passageways. Only the other day a lovely lassie told me, with blushing cheeks, about the old "wishing-bridge." "We," said she, referring to three couples out for a hike, "stopped at the yawning mouth of the wishing-bridge, made a wish, then held our breath as we rushed with might and main through the hollow darkness to the open air beyond; and there was a white horse entering, and a load of hay in the distance! Of course you know what those signs meant!"



Courtesy of Fitch C. Bryant

FIG. 13. THE KISSING BRIDGE, DEPOSIT

SANT' ANGELO BRIDGE, ROME

THE Emperor Hadrian built the Bridge of Sant' Angelo over the Tiber to connect his mausoleum, the Castle of Sant' Angelo, with the City of Rome in 134 A. D. Its original name, Pons Ælius, is part of Hadrian's own name—Publius Ælius Hadrianus. The bridge had eight arches with a sixty-two foot span. It stood for many centuries and was renewed on its original foundation.

The Tiber, the second largest river in Italy, was called at one time Alba (meaning white). Horace (65–8 B. C.), the satirist, must have felt that the color of the water was anything but white, for he called it "flavus tiberis," the turbid water. No doubt it was the navigable river, flowing through fertile valleys surrounded by low hills, that halted the wandering tribes at this point. Possibly the city got its name from the old river-god, Rumon, easily growing into Roma and Rome. Roman coins showing the stern of a ship stamped on them have been found which may represent the city's first escutcheon.

The first bridge over the Tiber was built by Ancus Harcius, a Sabine, fourth king of Rome, about 610 B. C. It was a pile bridge, Pons Sublicius, bolted with bronze, and led from the Forum Boarium, the cattle-market, between the Palatine and Capitoline hills. This is the bridge Macaulay describes so vividly in "Horatius at the Bridge." Horatius was keeping the bridge against Lars Porsena of Clusium. You remember he stood alone:

But he saw on Palatinus
The white porch of his home;
And he spake to the noble river
That rolls by the towers of Rome:
"Oh, Tiber! father Tiber . . ."

The bridge fell, hewed down by his countrymen, and his home was safe!

Nearly a dozen bridges cross the Tiber in Rome to-day, but of them all the Sant' Angelo Bridge is the most celebrated. In ancient time a covered way led from the Bridge of Sant' Angelo to St. Peter's, and later Pope Nicholas V planned to carry the present colonnade of St. Peter's on to the Bridge of Sant' Angelo, but his plan was never completed.



Courtesy of Mrs. J. H. Ransom

FIG. 14. SANT' ANGELO BRIDGE, ROME

MONT-BLANC BRIDGE, GENEVA

JULIUS CÆSAR said, nearly two thousand years ago, "Lake Geneva flows into the River Rhone," but Cæsar did not know where the Rhone rose. We say the river Rhone flows through Lake Geneva. At the point where the river leaves the lake is the Pont du Mont-Blanc, one of eight bridges that span the Rhone. Cæsar also said, "The Helvetii crossed the Rhone by means of a bridge of boats. . . ." And from the first century before the birth of Jesus the Christ until to-day bridges have spanned the Rhone in Geneva. From Mont-Blanc Bridge to the east we can see snow-clad Mont-Blanc, 15,781 feet in height, towering above the surrounding peaks more than three thousand feet.

Now turn to the left and in front of us is Rousseau's Island. Just beyond the island is the second bridge over the Rhone, Pont des Bergues. A chain bridge connects this bridge with Rousseau's Island. We will enter this quiet little spot and sit under the trees to rest. Here stands a bronze statue of Jean Jacques Rousseau (1712-78), made by the French sculptor Pradier (1834). He was a strange man, this Rousseau, but we love his memory because he was the first teacher to insist that more care should be given to schools for children. Rousseau was born in Geneva.

Byron (1788-1824) also watched these waters. He puts beautiful words into the mouth of Childe Harold:

By the blue rushing of the arrowy Rhone,
Or the pure bosom of its nursing lake,
Which feeds it as a mother . . .

We can scarcely believe that the turbid gray water entering Lake Geneva at the east end is the same river as the blue crystal water flowing under Mont-Blanc Bridge as it comes from the lake. I once followed the Rhone to its source and stood at the foot of the glacier where the sun, eating a hole in its face, set free the water of the river. It was easy to step across the tiny stream of milky water trickling over the stones.



Courtesy of Mrs. J. H. Ransom

FIG. 15. MONT BLANC BRIDGE, GENEVA, SWITZERLAND

BROOKLYN BRIDGE, NEW YORK CITY

JOHAN A. ROEBLING (1806-69) was the "Father of Brooklyn Bridge," though he died before a stone was laid. An accident at Fulton Ferry, while he was surveying for the towers, caused his death. Colonel Washington A. Roebling (born 1837), his son and first engineer, went on with the construction. That part of the construction requiring the greatest physical exertion was sinking the steel cages or caissons. The work was done with high air-pressure, and no one then knew how to guard against accident or physical harm; the method was new. One day fire broke out in the caisson and Colonel Roebling went down himself and fought the fire for seven hours. After resting four hours he again fought the monster. The work was saved, but Colonel Roebling was left a physical wreck though a spiritual giant.

For ten years and more Colonel Roebling sat at his desk (he could not walk) in the bay-window of his home in Brooklyn and, watching through a telescope and helped by his wife, guided the building of the bridge. Masonry towers rose nearly three hundred feet high; cables, made wire by wire, strand by strand, were anchored and stretched across from shore to shore, until, on May 24, 1884, the work was finished and Brooklyn Bridge stood complete—a suspension bridge six times larger at that time than any bridge of its kind.

The cables for this wonder, manufactured right on the ground, had to be made after the towers and anchorage were finished. Each cable has nineteen strands and each strand three hundred and thirty-two parallel straight steel wires bound together every foot or so. The question now arose how a connection was to be made across the water at this busiest point in the East River. Experts, watching for months, found that every day in the forenoon the water at this particular point was clear of craft for from six to seven minutes. In the forenoon of August 14, 1867, a cannon-shot gave the signal; wires were cut and lashed on the bridge dock, the engine put in motion, and in four minutes the wire rope came out of the water and in six minutes it hung clear over the tallest masts. Brooklyn and New York were united! A great shout arose from the thousands watching for what "could not be done"!

Colonel Roebling partly recovered his health and is still with us. His life is an inspiration and his spirit is a guiding star for all time.



Photo from Brown Bros.

FIG. 16. BROOKLYN BRIDGE, NEW YORK CITY

PONT DE LA CONCORDE, PARIS

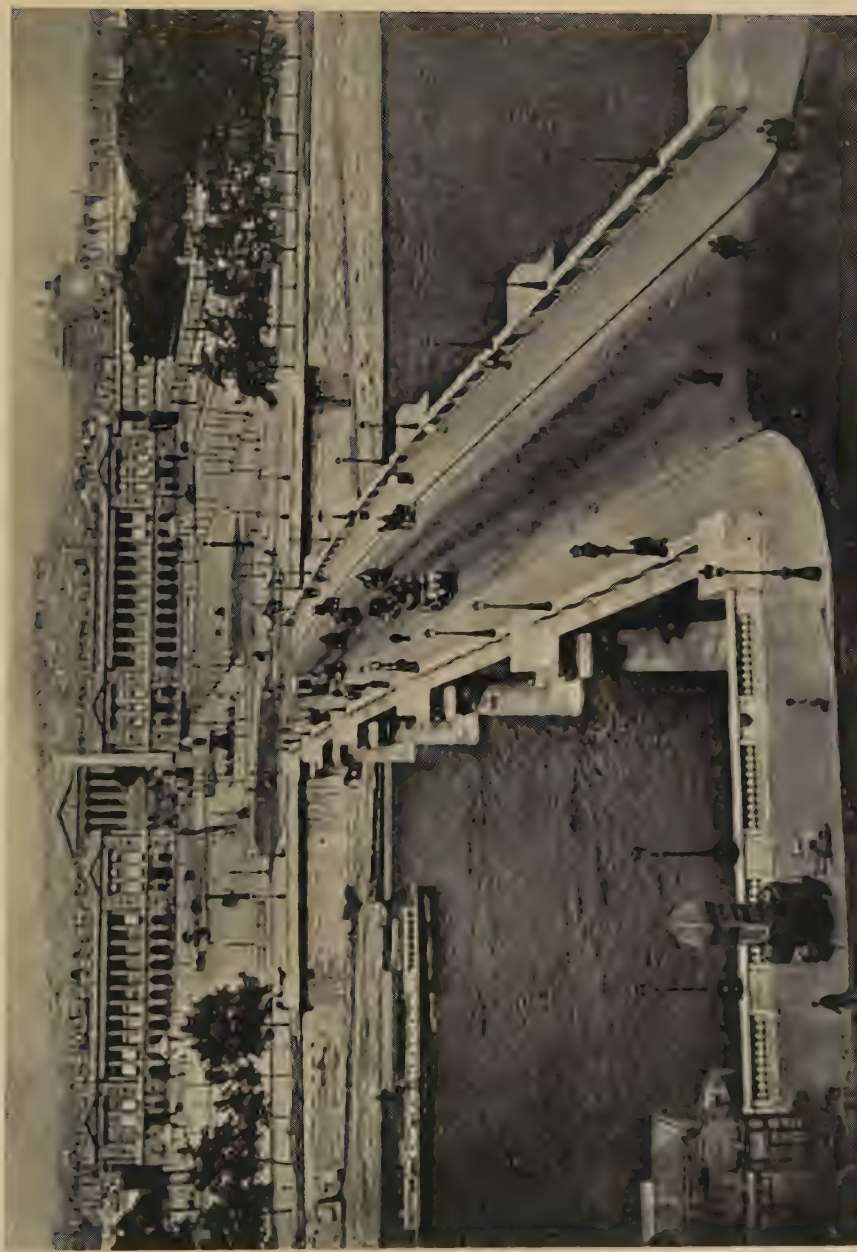
THE river Seine cuts Paris in two like an ox-bow, with the bow end to the north. The river flows north by west, then south by west, and the Pont de la Concorde spans the top curve, at the farthest point north.

This celebrated bridge was being built (1787-90) at the time the Bastille—a prison so horrible that the very name curdles our blood—was destroyed, July 14, 1789. The stones from the Bastille were built into the upper part of this beautiful bridge. Possibly if we listen closely, Perronet, the architect of the bridge, may whisper secrets to us of those terrible times. Perronet himself was in the French Revolution.

From no spot in Paris can be seen places of more stirring historic interest than we can see from this bridge. To the north in the distance is the Madeleine or Church of St. Mary Magdalen, a copy of an ancient Corinthian temple. It was begun in 1764 and finished in 1842. Napoleon wished to make the Madeleine a Temple of Glory, but Louis XVIII said no, he wished it to be an offering to purify them of their sins, especially the awful sin of beheading their king and queen, Louis XVI and Marie Antoinette. The church, made of stone, is unique in that it has no windows; light comes in from the roof.

To our right is the Tuileries Garden. The word *tuileries* means tile-kilns, some of which were originally on the spot where the palace was built and now where the Tuileries Garden is. A French friend of mine, who was in Paris when the Palais des Tuileries was burned in 1871, refers to that fearful time as one "when passion was at white heat, blindly destroying what it could never replace." Paris has suffered from the most terrific bloodshed and devastating fire from the enemy, but she has survived the tragedy of it all, and smiles. We can scarcely believe that less than two hundred years ago the Place de la Concorde was still a desert. To-day this square is one of the most beautiful in the world.

The piers of the bridge are in the form of half-columns. On these columns were colossal statues of generals, but these have been replaced by statues of great men who live because their works do follow them.



Courtesy of Mrs. J. H. Ransom

FIG. 17. PONT DE LA CONCORDE, PARIS

THE GREAT NILE BRIDGE, CAIRO

CAMELS, the Ships of the Desert, have been carrying freight back and forth across bridges over the Nile for centuries. When, however, a French company opened the Great Nile Bridge (Pont de Gezîreh), a few years ago, what must Mr. Camel have thought to find colossal lions sitting on the high parapets at the ends of the new bridge, waiting to welcome him! The bridge, made of iron, is nearly a third of a mile long and one hundred and sixty-five feet wide. For an hour twice daily the drawbridge is open and strange water craft pass through. It is worth our while to watch the crowd gathered on the banks while the loaded ships have the right of way. The Great Nile Bridge connects Cairo with the Island of Gezîreh, on the road to the pyramids.

The islands of Gezîreh and Rôda have been noted in the history of Cairo from its earliest time. Bridges have been built and destroyed from century to century, and bridges of boats have been used all down the ages to connect the islands with Cairo. Bits of information from travelers give us vivid pictures of daily life in those far-off days. A Persian philosopher in 1048, writing about ancient Cairo, says, "To cross to the island of Rôda there was a bridge of thirty-six boats, but at that time there was no second bridge connecting Rôda with Geza and one had to take a boat or ferry."

In 1168 the king of Jerusalem came and tried to burn Cairo by lighting twenty thousand naphtha barrels and ten thousand torches. In this charred and burned city which again sprang into life we have the real home of the Arabian Nights tales. To understand Cairo you must read the tales of that fascinating book "A Thousand and One Nights."

Not only are the stories from the Arabian Nights strange and weird but Egypt herself tells a queer tale of the origin of the overflow of the Nile, her sacred river, thousands of years before Aladdin is supposed to have lived. The Egyptians believed that when Osiris, the good king of the South, died, his wife Isis shed so many tears into the Nile that it overran its banks.



Courtesy of Mrs. J. H. Ransom

FIG. 18. THE GREAT NILE BRIDGE, CAIRO

LE PONT, CONSTANTINE, AFRICA

IMAGINE a gorge six hundred feet deep; a furious mountain stream, the river Rummel, meaning a river of sand; rocky banks rising at angles of forty-five to sixty degrees; houses clinging to the rocks, like flies to a wall, and a city crawling over mountain peaks a thousand feet above sea-level, connected by bridge on bridge—and you have Constantine, a city in northern Africa. Never was a city set on a mountain-top so impossible yet so real.

This ancient city was founded, possibly, as early as the ninth century B. C., by the Phoenicians. At first it was a fortress to protect the interests of the Syrian merchants trading between Asia Minor and the African coast on the Mediterranean Sea. Its old name, Cirta, meant town. When once rooted on the mountain-top this fortress began to grow and is likely to keep on growing. Of course emperors tried to destroy it, but each time the new growth has exceeded the old.

Finally the Roman emperor Constantine the Great (272–337) came and changed the name from Cirta to Constantine. He made it the capital of the province of Constantine, which lies between Tunisia on the east and Algeria on the west.

Engineers and bridges have kept Constantine on the map for nearly three thousand years. Such feats of engineering as those shown in the picture seem unbelievable. We step from the railroad train on the ground floor of the city, as it were, enter an automobile, and begin to ascend. We cross a bridge hanging over the tumbling water of the Sand River and then, without knowing how we reached it, we cross a second bridge higher up, hanging over the same troubled pool. Again we go up and up and cross a third bridge, still hearing faintly the complaining water in the same pool. We are now in Constantine.

Never-to-be-forgotten Constantine! Her heights and depths and her unrivaled bridges hanging securely across perilous chasms simply make us gasp at the daring of it all. We doff our hats in honor to the engineers who made this impossible city possible.



Courtesy of Mrs. J. H. Ransom

FIG. 19. LE PONT, CONSTANTINE, AFRICA

CONWAY BRIDGE, WALES

TO be in Conway at nightfall and watch the shadows in the river from this bridge leaves a never-to-be-forgotten picture. Hark! we hear the curfew ring, according to that quaint old custom, *cover-fire*, when all fires were covered up for the night at the sound of a certain bell.

Conway, on the Conway River, is one of the most picturesque towns of Wales. It is full of fascinating history with its ancient walls, spooky towers, huge gateways, and old castle built in 1284. Hawthorne says of the castle, "Nothing ever can have been as perfect in its own style, and for its own purpose when it was built; and now nothing else can be so perfect as a picture of ivy-grown peaceful ruin." We know of nothing more beautiful than this modern bridge and ancient castle hobnobbing together. What is a paltry six or seven hundred years' difference in age, when the spirit of true art finds a dwelling-place in the souls of men! Stevenson and Telford, the two great English architects of the first tubular and suspension bridges, and of these over the Conway River, held communion with the architect of this ancient castle, whatever his name. Each of these experts communed with the Great Architect, for what they built is in perfect accord with Nature's laws.

There are curious epitaphs in the old Church of St. Mary. We read on a monument to Nicholas Hooker: "The 41st child of his father and himself the father of 27 children."

The historic Conway River, only thirty miles long, was important to Rome, says Tacitus, at the beginning of the Christian era, for its pearl fisheries. All down the centuries writers speak of its pearls. During the reign of Charles II (1630-85)—Charles is in Van Dyck's "Baby Stuart" picture—Chamberlain Wynn gave to Queen Catharine a Conway pearl which is said to be in the British crown. The crown is in London Tower for safe-keeping to-day.



Courtesy of Mrs. J. H. Ransom

FIG. 20. CONWAY BRIDGE, WALES

PONT DU LOUP, THE RIVIERA

THE Riviera (meaning coast) has taken to itself a character all its own. Its name alone suggests to our imagination attractions in scenery, climate, and position unequaled elsewhere in Europe. Stretching for miles along the coast-line of northwestern Italy and southeastern France, hugging the Apennines and the Alps, its feet in the blue waters of the Great Sea, it all presents an unending array of fascinating scenes.

But a climax comes when, on the narrow-gage Sud Railroad, we cross the river Var and rush pell-mell through tunnels, over viaducts spanning terrifying gorges, among whole farms of gay flowers, and land at Pont du Loup. If it is nightfall when we stagger over bridges hung in mid-air—for our toy train swings from side to side in its mad race—and skirt narrow paths above bottomless pits, we sure feel the fantastic rocks are wolves ready to spring at our throats, especially as we cross the Bridge of the Wolf! Then comes an awful shriek. Is it the dying howl of a wolf or the death-gasp of our shrieking engine? And yet, they tell us, there has never been an accident on this terrifying stretch of engineering.

Never were curves so graceful, or masonry so splendid, or arches on tall piers so dignified as in this bridge and viaduct one thousand feet above sea-level. From the bridge we climb up and up to Gorges du Loup, seeming to bound over monster boulders; then, still ascending, we reached the Wolf's Tooth, Dent du Loup, and look down twenty-two hundred feet to the Mediterranean Sea.

From Pont du Loup are seen the valley of the Var and the sea beyond, and we almost see Monaco—"the smallest principality on the planet and the wickedest," says Higinbotham—and Nice, her next-door neighbor! Excursions out from Nice along the Riviera keep us in a constant state of excitement over marvelous feats of engineering. Nothing is too difficult for the trained engineer. His roadways, mounted on stilts, climb mountains and bridge dizzy heights, cross raging rivers, and circle around the rocks of yawning precipices as easily as when he pushes a cut-off through Great Salt Lake (see page 44).



FIG. 21. PONT DU LOUP, THE RIVIERA

Photo from William Thurman

GREAT SALT LAKE CUT-OFF, UTAH

BRIDGING Great Salt Lake! Less than a century ago the country round it was a region of desolation—a thousand miles from human habitation. To-day it is a vast plain of wealth and up-to-dateness. For years Great Salt Lake was an obstruction to be shunned, and the Southern Pacific Railroad, knowing this, built its road around the lake, regardless of expensive curves and of distance and time. The public, however, grew restless under the loss of time and demanded that something be done.

In 1901 the project to bridge Great Salt Lake took shape. In a little over a year the last spike—a solid-gold one—was driven in by President E. H. Harriman, which completed the Great Salt Lake Cut-off of the Southern Pacific Railroad. This cut-off reduced the distance from the Atlantic to the Pacific about forty-four miles, which pleased the public, and cut down the running expenses of the road, which pleased the owners—and gave the world a marvelous piece of railroad engineering.

One of the difficulties in building this Ogden-Lucin cut-off was to find bottom in the Bear River as it enters Great Salt Lake. A pile twenty-six feet long disappeared at one stroke of the hammer. A second pile two feet longer was placed in the exact spot and at one stroke of the hammer it, too, disappeared. The workmen then spliced two forty-foot piles together and drove them down. They struck rock bottom after going through fifty feet of mud—and this was the fabled bottomless hole. Rocks were dumped in until the piles were a solid mass.

The men were expected to work in rubber boots but the salt water destroyed the rubber. It was all right working in salt water in ordinary boots and clothes in summer weather, but when winter came and hands and faces were chapped, the workmen suffered great discomfort. But the salt water was not all loss to the workmen, for the heavy timbers floated into place as though some fairy was holding them on top of the briny water. Great Salt Lake has 14.8 per cent. of mineral matter, while the ocean has only 3 per cent. Also, no wood will rot and no iron will rust, it is said, in this "Dead Sea of America." The giant bridge with its trestle-ballast of gravel fifteen inches deep under the ties is as firm as Gibraltar. We ride for miles and miles surrounded by the sparkling water, yet the train runs as safely as on solid land.



Photo by Brown Bros.

FIG. 22. GREAT SALT LAKE CUT OFF, UTAH

THE CHARLES BRIDGE, PRAGUE

THE strange legend of St. John of Nepomuk, patron saint of bridges and running water in Austria and Bohemia, still clings to the Charles Bridge (Karlsbrücke). St. John lived in the fourteenth century. Cruel Wenceslaus IV tried by torture to compel him to reveal the secrets the queen, the beautiful Joan of Bavaria, had told him, her confessor. And when John refused, he ordered him to be thrown into the River Moldau, at the spot where now is the Charles Bridge. The body, says legend, floated for a time and five brilliant stars appeared. When the body sank, the stars lingered over the spot. The emperor, seeing the stars, fled in terror. A hundred years later—1620—Prague was besieged. It is reported that St. John of Nepomuk was seen fighting with his people.

The Charles Bridge was built sometime in the fourteenth and fifteenth centuries. The buttresses have thirty interesting statues of men and saints. The bronze statue of John of Nepomuk was made in Nuremberg, in 1683, and after nearly fifty years the holy man was canonized by Pope Benedict XIII. Also, a curious old crucifix on the bridge has an inscription relating that it was erected with money the Jews were made to pay because they reviled the Cross in 1606.

Two old towers, one at each end of the Charles Bridge, were built as early as 1451. The Altstadt Tower on the west proved a tower of strength in defending Prague against the Swedes in 1648; but, to its disgrace, less than twenty-five years before an iron cage hung on the gallery wall contained the heads of Protestant nobles beheaded by Ferdinand II, Emperor of the Holy Roman Empire. They were kept there ten years, but Ferdinand had to acknowledge that he could not exterminate the Protestants.

Thousands of pilgrims come to visit the Charles Bridge to do honor to St. John of Nepomuk, especially on May 16, the saint's festival day.



Courtesy of Mrs. J. H. Ransom

FIG. 23. THE CHARLES BRIDGE, PRAGUE

STEPHANIEBRÜCKE, VIENNA

OLD bridges and new bridges galore connect the city of Vienna with its nearly half-hundred suburbs. The city proper, surrounded by the Danube River and its tributaries, is set in the middle of a wide plain bounded by distant mountains. Probably Trajan (53–117 A. D.) was the first to build a bridge over the Danube at Vienna. The Roman historian Dion Cassius mentions it, and a relief on Trajan's Column in Rome shows the bridge with its masonry piers and timber arches. Report says the bridge was three or four thousand feet long—probably a newspaper item of the day.

The Stubenthorbrücke, over the tributary Wien, is one of the oldest bridges in Vienna. If we follow the Wien north until it enters the Danube, then turn east, we come to the Aspern Bridge, the real beginning of that famous boulevard the Ringstrasse which encircles the whole inner city, built by imperial order in 1858. Before that time a high embankment and moat formed part of the fortifications of the city. The broad street with its bordering trees and shrubs is certainly much more attractive. A little park-like boulevard is shown in the picture.

Many weird and fantastic stories, part truth and part legend, are connected with the Danube River. One very human story is about Leopold, Margrave of Austria in the eleventh century. He loved his wife, Agnes of Swabia, very dearly. Shortly after their marriage, as they stood hand in hand on the palace balcony overlooking Vienna and the blue Danube, they vowed that some day they would build a house of worship, in gratitude to God. As they planned, suddenly a puff of wind lifted the bridal veil from Agnes's head and carried it away. Several years later Leopold, while hunting in a forest near Vienna, found the veil hung on a tree. Remembering the vow, he ordered the forest cut down and built the monastery of Kloster-Neuberg. Eighteen children came to bless Leopold and Agnes; eleven of them were living when Leopold died, November 15, 1136. He is one of the patron saints of Austria.



Courtesy of Mrs. J. H. Ransom

FIG. 24. STEPHANIEBRÜCKE, VIENNA

SOOCHEE BRIDGE, CANTON, CHINA

PEOPLE and smells and noise are the three never-to-be-forgotten features of Canton. Of the noises those connected with the closing and opening of the gates of the bridges are probably the most hideous.

The Soochee Bridge across an arm of the Pearl River connects the less crowded and filthy quarter of the city and the more crowded and filthy quarter. At nightfall the gates at the ends of the bridge are closed and locked, amid a ceremony of noise—noise of every kind and variety. At daylight the gates are unlocked and again noise concentrates at this particular point and announces that day has begun. The large buildings on the left of the river are the Sow-chun or Chinese Hotel, and the square building back of the hotel is the pawnshop.

Canton is a mystery of mysteries, as well as a nightmare. Its streets are mere lanes. No horses, no mules, no wheeled vehicles—just rats, ducks, chickens, and people. Some people are in sedan-chairs or rickshaws, but most of them slip, slide, and sneak through the alleyways and along the innumerable slimy creeks crawling about the city. Many stone bridges cross these creeks.

The Pearl River—or, in Chinese, Chu-Kiang—borders one side of Canton, and a high stone wall crowds the other three sides so close to the water that at least one million people live, move, and have their being in boats or sampans on the river. Many are born and die without ever leaving their floating homes.

Just why this swarming waterway is called "Pearl," I do not know. To us a pearl is pure and undefiled; the Pearl River at Canton is dirty, smelly, and brown; and yet Canton fascinates us. We may feel a little creepy, jostling against these half-nude hunch-shouldered burden-bearers in their own country, but we feel Sir Frederick Treves is right: "The 'Yellow Peril' does not exist." We look down upon the swarming millions—there seem millions—from our vantage-point on the Soochee Bridge and seem to hear the cry of these people: "China for the Chinese."



FIG. 25. SOOCHEE BRIDGE, CANTON, CHINA

Courtesy of Mrs. J. H. Ransom

BRIDGE OF BRUGES, BELGIUM

GABLED houses, canals, and bridges make Bruges a most picturesque and interesting city, though we can scarcely believe, seeing her to-day, that she was ever one of the most enterprising cities of the Netherlands, with a population of 150,000. In the fifteenth century her merchants were engaged in world commerce. Ships sailing the high seas, bringing rich stuffs from the Orient, came to her very door—as many as one hundred and fifty in a day.

Bruges is nine miles from the North Sea, on the ship canal, and is itself cut in every direction by deep canals. As its name suggests, it is a city of bridges. Over half a hundred of these low-hung bridges, many of them adorned with statues, cross and recross the slow-moving tide-water, and each bridge opens in the middle for the passage of vessels. The scene must indeed have been a gay one when boats decked with the multicolored flags of many nations sailed through the heart of the city. Stately dames gowned in silks and satins were attracted to the windows of the gable-end houses, to look at the passing pageant. Little wonder that a French queen, visiting Bruges in the heyday of its prosperity, exclaimed, "I thought I was queen, but here are hundreds whose costumes rival mine."

The work of art of world-wide interest in Bruges is the "Shrine of St. Ursula," by Hans Memling; in the Hospital of St. John. On this little Gothic chapel—three feet long, three high, and a foot wide—is portrayed, in a series of pictures, one of the most thrilling stories of any saint, that of St. Ursula and her eleven thousand virgins. Memling finished this art treasure in 1489.

A dear little legend is connected with the swans sailing on the canal near the bridge. A painting by David Gerard, 1498, in the Bruges Museum, tells the story as taken from Herodotus. An unjust judge, Sisamnes by name, under King Cambyzes of Egypt, was condemned to be flayed and his skin hung on the judge's seat—a warning to Sisamnes's son, who became judge in his father's place. Ten years before Gerard painted the picture an unjust judge was executed in Bruges. Maximilian condemned the city as an atonement to support for all time the swans on the canals in Bruges.



Photo from William Thompson

FIG. 26. BRIDGE OF BRUGES, BELGIUM

THE BRIDGE OF SIGHS, VENICE

THE Italian who repairs my shoes speaks very little English. I asked him, one day, "What is the Italian for . . ." drawing a long sigh. "*Sospiri*," he answered quickly, his eyes twinkling; then he added, "Ponte dei Sospiri!"

The Bridge of Sighs, scarcely three and a quarter centuries old (about 1595), is without question the most widely known bridge in the world. There it hangs in mid-air, "a place and a prison on each hand," defying the ages to lessen its notoriety. We have come to Venice at least to stand on that bridge, though Childe Harold warns us:

Unless you would pass o'er
The bridge which few repass.

We feel a shiver creep down our spine, though we know few prisoners undeserving of their fate have ever gone over the present bridge. The public will continue to love Byron's tender story of the bridge despite the fact that Ruskin calls it "ignorant sentimentalism," and Howells dismisses the noted bridge as "that pathetic swindle, the Bridge of Sighs."

To visit the Bridge of Sighs we go through the Doge's Palace and down into the celebrated dungeons under the palace. On the walls of these prisons are inscriptions cut into the stone by prisoners of long ago. One inscription, by an unknown prisoner, brings honest tears to our eyes. It says, "My turn to-day, to-morrow yours." These dungeons are not dug deep in the earth, as many people seem to think, but are level with the water in the canal outside the walls.

Rigid watch was kept over each convict, whether he was a political prisoner or one deserving punishment, in the dark, damp, unwholesome cells we now visit. It is recorded that just after the Bridge of Sighs was built a number of convicts, with a special leader, planned to escape through the canal by the bridge, but the Council of Ten discovered the plot. A year later the leader with others did escape through the Doge's Palace along these very corridors.

This is historic ground. Some of the most thrilling events of man's strange progress along the centuries were plotted and defeated in these structures—the Doge's Palace, the Prison, and the Bridge of Sighs.



Courtesy of Pratt Institute

FIG. 27. THE BRIDGE OF SIGHS, VENICE

BRIG O' DOON, AYR, SCOTLAND

TAM lost his head and shouted, "Weel done, Cutty-sark! And in an instant all was dark." We hurry past "Auld Alloway Kirk" lest the witches catch us in this gruesome place. The roof gone, the Auld Kirk stands gable-end to the street, with gaping windows minus glass and frame. It is the Auld Brig over the river Doon we have come to see. If only Tam o'Shanter on his Meg would appear, how delighted we should be! You see, Tam had been drinking over much and stopped, on his way home, at the staring windows of the Kirk, to watch the witches dance. In his befuddled condition he forgot he must not speak and cried out to Nannie, the chief dancer, "Weel done, Cutty-sark!" when out went the lights and out flew the witches, Nannie in the lead, and away went Tam on Meg at full speed.

Now do thy speedy utmost, Meg,
And win the key-stane o' the brig:

* * *

For Nannie, far before the rest,
Hard upon noble Maggie prest,
And flew at Tam wi' furious ettle:
But little wist she Maggie's mettle!
Ae spring brought aff her master hale,
But left behind her ain gray tail:

* * *

Think! ye may buy the joys o'er dear;
Remember Tam o' Shanter's mare.

There are two bridges close together over the river Doon, the Auld Brig, built as early as 1250 and still standing, and the New Brig, which has been rebuilt.

The river Doon, only thirty miles long, flows through the small Loch Doon and empties into the Forth River close by Ayr, Scotland. So small and unimportant is this river that but for Bobbie Burns it would never have been heard of. And who was Robert Burns (1759-96)? Only a farmer boy who saw the river, the bridge, the kirk, and Tam, and set them to jingling until every heart leaps with delight at the mere sound of the names.



Courtesy of Pratt Institute

FIG. 28. BRIG O' DOON, AYR, SCOTLAND

PUENTE NUEVO, RONDA, SPAIN

RONDA is full of surprises. Being in the province of Malaga, it of course has delicious grapes and wine, and bordering Andalusia opens up wild and picturesque haunts and glimpses of superb horses. And then there are the bull-fights, which are proverbial.

Then its Tajo (deep-cut gorge) is such a dizzy height for its bridges—especially the Puente Nuevo. Through this gorge flows the river Guadalevin. At the narrow point spanned by the bridge the foaming river fills the gorge with dancing spray through which rainbows play hide and seek.

Southeastern Spain is one grand panorama of mountain peaks and deep gorges, with turbulent rivers—sometimes mere mountain streams—tumbling and tearing their way through to the Mediterranean Sea. All this section is geologically young. The Strait of Gibraltar is a part of the same convulsion which opened a new path between the Atlantic Ocean and the Great Sea.

Ronda sits on top of the cliff, like an eagle's nest. It dates as far back as the Roman Arunda. Arunda had fallen into decay, but in the eighth century, when the Moors conquered Spain, they rebuilt it and called it Ciudad. But when the "Catholic Kings" conquered the Moors (1492), the town took the name Ronda, probably a reminder of the Roman name.

We stand on the bridge built in 1761, and look down the sheer sides of the gorge to the broken and tumbled rocks in the river-bed and wonder, "What is age?" Here are the age-old rocks, the century-and-a-half-old bridge, and the growing cacti,—just as new a thousand years ago,—and the mills of to-day sturdily doing their work.

We go down the three hundred and sixty-five steps of the Mina, an underground staircase, to the river-bottom. The Moors built this stairway to guard against a water famine in case of a siege. The stairway was restored in 1911.



Courtesy of Mrs. J. H. Ransom

FIG. 29. PUENTE NUEVO, RONDA, SPAIN

DANCE-OF-DEATH BRIDGE, LUCERNE

God's blessing on the architects who build
The bridges o'er swift rivers and abysses
Before impassable to human feet

* * *

The Dance of Death!
All that go to and fro must look upon it.

THE pictures between the rafters under the roof of the Dance-of-Death Bridge (Mühlenbrücke) are not very cheerful in subject. One little family scene of a baby in a cradle is a lovely, homy picture, but look! there at one side of the picture stands a skeleton—Death—dressed in every-day clothes, with a skull face grinning at us from under his hood. Death appears again and again, in the church and the law office, in the dance-hall and at the wedding, in the banquet-hall and the family circle—always grinning.

At one time there were a number of covered bridges in Europe with the Dance of Death shown on their walls, but I believe the Mühlenbrücke at Lucerne is the only one left which depicts this gruesome subject. The subject is a very old one in art. Hans Holbein the younger (1497–1543), a famous German world artist, designed a series of small wood-cuts showing the "Dance of Death." But two hundred years before Holbein's time it was used as a subject in art.

Do not fail to study the pictures in the Dance-of-Death Bridge at Lucerne, with Longfellow's "Golden Legend" as your guide. The old bridge was built in the Middle Ages. Both the Kapellbrücke and the Mühlenbrücke, only a few rods apart, cross the river Reuss at an oblique angle. The paintings on the Dance-of-Death Bridge were done in the eighteenth century. No one, it seems, has used the subject since, at least not on bridges. When this bridge disappears, the Dance of Death as a subject for pictures may disappear too.



Courtesy of Pratt Institute

FIG. 30. DANCE-OF-DEATH BRIDGE, LUCERNE

PONTE VECCHIO, FLORENCE

TITO MELEMA, a famous character in George Eliot's "Romola," jumped through an arch of the Ponte Vecchio into the river Arno. Tito had everything to make life a joy—beauty of person, a fine intellect, and an ability to make friends. But Tito thought of no one but Tito. He became so false to his good instincts that even the crowd in the street turned against him. When the mob pursued him he rushed to Ponte Vecchio, thinking to escape.

The Ponte Vecchio, unique among the bridges of the world, joins two celebrated picture galleries, the Uffizi and the Pitti, which lie on the north and south banks of the Arno. The original Roman bridge was replaced in 1345. Probably Taddeo Gaddi, Giotto's greatest pupil, designed the present structure. Three low arches, resting on stone piers, carry the Ponte Vecchio across the river. Two hundred years later, in 1564, Vasari, the artist, built an upper story to the bridge which formed part of a corridor, over a third of a mile long, connecting Cosimo de' Medici's Uffizi Palace with his son's Pitti Palace.

One never-to-be-forgotten joy is shopping along the bridge roadway at the open stalls beckoning to us. The spectrum flashes its seven colors on all sides. Never was turquoise so blue or topaz so yellow or amethyst so purple or mosaic so varied. Never did tiny pearl give such grace to brooch and ring and ear-drop. We love it! And why not? Nature spreads the hues of the rainbow in our path and why should not the gem-vender?

Though Taddeo Gaddi lived six hundred years ago, yet somehow he seems very real to us. One day he and his friends were summing up the merits of men in the art world. One artist put the question: "Who was the greatest artist, putting Giotto out of the question?" (Giotto, you will remember, painted that lovely picture "St. Francis Preaching to the Birds.") Several names were mentioned, then Taddeo Gaddi remarked: "Truly, these were able painters, but art is decaying every day." One might think that Taddeo gave that opinion over the radio last night.



FIG. 31. PONTE VECCHIO, FLORENCE

Courtesy of Pratt Institute

ROMAN BRIDGE, VERONA

VERONA, on the Adige River, was ancient even when the Romans took it in 89 B.C. Just when the Romans built this stone bridge is a question, but we know that when Alboin, from Lombardy in the north, took Verona in 568 A. D., the bridge was here. Alboin married Rosamunde, the daughter of the king of Verona, and then killed the king. To show his authority, he made Rosamunde drink wine out of her father's skull, but, for this inhuman act, Alboin was killed by order of his new queen.

The Adige River, a swift, rough stream, curves in and around Verona on the north, then cuts through the city to the south. Many historic bridges have been built and rebuilt because of the cutting and slashing of the river through its banks at its own sweet will. It was more than a thousand years before the people of Verona roused up to their danger. Then it took the terrific flood of 1882 to force them to build the embankment that was finished in 1895. Now the Adige keeps within its banks.

Two of the bridges, just a mile apart, are the oldest and the youngest in the old town. The old one, Ponte della Pietra, spanning the Adige at its sharpest curve, still has two of the Roman arches seen at the right in the picture. These arches prove without a question that Roman bridge-builders knew how to build for all time. The bridge was once called Pons Marmorius, the *marble bridge*. When Theodoric the Great died, in his castle near by, in 526 A. D., the marble bridge was more than six hundred years old. The present castle stands on the original old wall.

The story of "Romeo and Juliet," laid in Verona, was a true story about a real boy and girl living in Verona about 1304. If we turn our backs to the old bridge and walk south, in six minutes we come to an old house on the wall of which a tablet states that it was the home of Juliet. The overhanging balcony is still there. I thought when gazing at it that I heard—or was it imagination?—Juliet murmur:

O Romeo, Romeo! wherefore art thou Romeo?



FIG. 54. ROMAN AMPHITHEATRE, VERONA

NUREMBERG BRIDGES, GERMANY

EVERYTHING is quaint in Nuremberg, the "City of the Empire"—even the bridges. But no bridge could look its usual self and cross the Pegnitz, a river as unusual as its name. It divides Nuremberg into two parts and each part is under a special saint. St. Lawrence, martyred by roasting, protects the southern one, and on the north St. Sebald, who looked out for the poor even when it took a miracle to do it. A church was built in honor of each saint. In St. Sebald's Church is a marvelous shrine on which are carved stories of his strange acts. One story is about a poor family burning icicles at the saint's command. The fire burns brighter and brighter as the glittering fuel falls on the coals.

A stone wall dating from the Middle Ages surrounds old Nuremberg, and of the many towers which stand guard in the wall we love best those at the entrance and exit of the Pegnitz River, decayed and broken though they are. The many bridges crossing the river seem as individual as people; only, theirs is an unchanging individuality. The three in the picture surely have taken on something of the character of the owners of the property they connect—and possibly some of their peculiarities, too! The little cluster of carved figures on the capstone of the pier may give special distinction, denied the households farther down-stream. At least the ornamentation is very attractive.

The numerous bridges lead us to unexpected nooks, where sometimes the scene is so intimate that we feel almost like intruders. No one seems to mind our shy glances of admiration. I was startled, though, when crossing one bridge, to find a half-grown calf standing on the ridge-pole of a house near by. My guide said carelessly, "That is the cow that never grew up!" It was of stone.

The suspension bridge in Nuremberg is the first of its kind built in Germany. Nuremberg is delightfully interesting: its quaint buildings, unique sculpture, and paintings, and its picturesque bridges fascinate us. We say with our own Long-fellow:

Not thy Councils, not thy Kaisers, win for thee the world's regard;
But thy painter, Albrecht Dürer, and Hans Sachs thy cobbler bard.



Courtesy of Pratt Institute

FIG. 33. NUREMBERG BRIDGES, GERMANY

SACRED BRIDGE, NIKKO, JAPAN

“ONE should not say ‘kikko,’ meaning *magnificent*, until Nikko has been seen!” and it is less than fifty years since the first foreigners were allowed to see Nikko. And now even the “Magnificent” Sacred Red Bridge is gone! The friend who lent me this photograph was in Nikko a few days before that awful collapse of September 23, 1902. Almost without warning, part of the mountain tumbled into the gorge and the Sacred Red Lacquer Bridge was gone. An old woman and her young grandson, from the tea-house near by, were gathering firewood on the hillside over the way. Startled by an unearthly roar, they saw the moving mass of water, boulders, earth, and forest trees lift their little tea-house and loved ones and hurl them to destruction. To-day the grief-lined old face, serving in the new tea-house built by her friends, looks like the scarred and seared river-bed at our feet.

The Red Bridge, built in 1636, was sacred to the shoguns (a shogun is a general of the Mikado) and to pilgrims coming to it twice a year. When General Grant visited Nikko in 1879, he was invited to walk over the bridge, but he declined because “it was too sacred to be defiled by him.” The little boys used to think it great fun to skip across it at night like so many monkeys at play.

The bridge, resting on two gray granite pillars, spanned the gorge of the Daiya River with one graceful arch eighty-three feet long. Legend says the bridge was built in memory of a miracle. Shōdō-Shō-nin, seeking the sacred mountain he had often seen in his dreams, came to the swift river at Nikko. He prayed earnestly for the gods to help him. A dragon appeared. The holy man told his troubles to the strange listener. The dragon called the god in the little shrine. The god came out with two dragons, a red and blue, in his hands. He set them one on each edge of the gorge and bid them form a bridge. They obeyed and stretched themselves across the chasm. On their backs sprang up rich green grass. Shōdō-Shō-nin quickly crossed over the turbulent stream, on the miraculous bridge. Old histories call the bridge *Yama-suge-no-jabashi*—“mountain-grass-dragon-bridge.”

The demi-lune—half-moon shape—of Japanese bridges is taken from “Buddha’s Mother’s Hat.”



FIG. 34. SACRED BRIDGE, NIKKO, JAPAN

Courtesy of Pratt Institute

THE FIRTH OF FORTH BRIDGE, EDINBURGH

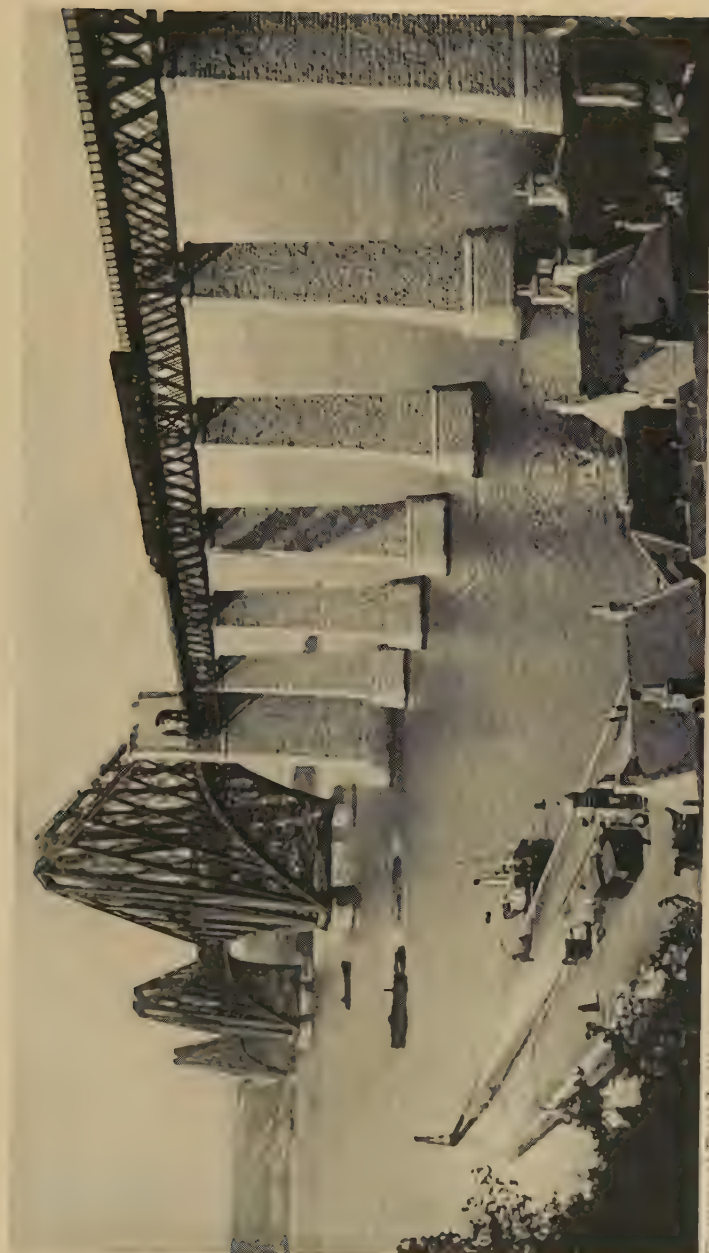
“THE Firth of Forth Bridge,” said Monsieur Eiffel, “is the greatest construction in the world!” If that is the judgment of the man who built the wonderful tower in Paris, it must be true. The bridge certainly dominates the surrounding country, in its size, in its pictorial effect, and by its helpfulness.

The bridge is built on the cantilever-and-central-girder principle. In other words, each section is built on a pier balanced or kept in “stable equilibrium” by its own weight, and these sections are joined together with central girders. Its granite piers, the deepest one sunk eighty-eight feet below the surface, are as solid as the earth itself. The central pier is sunk on a small island, as shown in the picture. The length of the bridge is nearly a half-mile, and the main spans, seventeen hundred feet long, are a hundred feet longer than those of Brooklyn Bridge (see page 32).

Towers on the land are very important parts of suspension and cantilever bridges, for on them is anchored the structure thrown across the depth below. In the Firth of Forth Bridge the steel towers, at which the cantilevers begin, are nearly as high as St. Paul’s Church towers in London. The height above the floor of the river is one hundred and fifty feet above high-water mark.

The Firth of Forth Bridge still stands as a unique engineering conquest. Not even the marvelous bridges over the Menai Strait, Wales, excel it (see page 90). The bridge was begun in 1883 and opened in 1890. It cost nearly ten million dollars.

The Firth of Forth and its triumphant bridge can easily be seen from every height in Edinburgh, two miles away. This part of the river is an inlet of the North Sea; the word *firth* means an estuary or narrow arm of the sea. The main river, the Forth, rises near Ben Lomond, flows east, and when it joins the inlet takes both names, Firth of Forth.



Continued from Page 34



FIG. 35

THE FORTH OF FORTH BRIDGE, EDINBURGH

TOWER BRIDGE, LONDON

THIS is a sightly spot, here on the latticework footpath in the middle of Tower Bridge. We are one hundred and twelve feet above the carriage-way of the bridge. This high footpath was reached by stairs and a lift in the towers, but they are closed now. Looking to the north, we see the old City of London, with the Tower a little to the left. The leaves of the drawbridge are open below us and the ships are passing through to the port of London, to our right. This is where the sea-going steamships of the Thames really start. Just west of these docks is London Bridge.

Tower Bridge is of wrought-iron and combines the cantilever—a center with two projecting beams—and suspension in its structure. There are four towers, two tall ones in the river and two on the bank. These towers, with those of the Tower of London to our right, are just the objects that give beauty to this overcrowded spot. The suspension chains starting from the shore towers are fastened to the tall towers where we stand. The skeleton of the towers is of steel faced with Portland stone, and backed with brick. Tower Bridge is not only a marvel of the engineering art but a bit of architecture of rare beauty. This bridge was opened by King Edward VII.

The river Thames makes a right-angle turn as it sweeps through London. At this turn is the Waterloo Bridge, often called the “English Bridge of Sighs” because of the many suicides from it. This bridge was designed and built by John Rennie and opened June 18, 1817. At first it was called the Strand Bridge and then its name was changed to commemorate the victory at Waterloo in 1815. Thames means “broad water.” One curious thing about the river is that the tide comes up to fifteen miles above London Bridge at Teddington, Tide-end-town,—possibly that is the meaning of the word,—nearly sixty miles from its mouth.

The Thames simply teems with historic events, and the bridges seem to be the connecting links, particularly in London. There is Battersea Bridge (shown on the title-page) at Old Chelsea. Close by was the home of Sir Thomas More, where Henry VIII used to walk with him by the hour after dinner, “holding his arm about his neck,”—only to order his head cut off later!



Courtesy of Pratt Institute

FIG. 36. TOWER BRIDGE, LONDON

FOLLY BRIDGE, OXFORD

OXFORD is a bewitching place! Fun, wisdom, and folly meet here on the friendliest terms. And why not? The boats on the river make gala days a joy; the bells in the towers call every one to the halls where wisdom is found, and folly!—why, that is everywhere and especially on Folly Bridge.

Story and legend have been busy with Folly Bridge for many centuries. The bridge leads into the city from the south. Near the bridge the river Cherwell mingles its waters with the Isis, as the upper reaches of the Thames are called. A hundred years ago there stood over the roadway of the bridge a gaunt tower with a single room entered by swivel folding doors. This room was the secret study of Roger Bacon, seven hundred years ago (1214?-94).

Now, Friar Bacon dealt in the art of Black Magic. He was experimenting on automobiles and flying-machines long before the Wright brothers were born. People said the tower was haunted. They were sure that they could hear ghosts and demons pattering up and down its black winding stairs. Poor Roger! of course he could come to no good doing things that nobody could understand. He was clapped in and out of prison for his queer doings, until he died at Oxford when he was eighty years old.

But Roger Bacon's death did not stop the work of the demons. A legend grew up during the centuries that the tower would fall of itself on any man who knew more than Friar Bacon. (The public had begun to honor the much imprisoned Roger!) This was a terrible state of affairs. Oxford students were rapidly growing in wisdom, and no telling how soon some one might make a carriage run without horses or rise in the air and sail away. The tower must come down, and down it came one hundred years ago. Dear Roger Bacon! Oxford students stand on Folly Bridge to-day with the same eager forward look toward London, and wonder why the bridge is called Folly.

Let us linger on Folly Bridge and drink in the beauty of Christ Church Meadows. Was there ever such soft, velvety grass, or grass more thickly studded with daisies no bigger than your thumb-nail? Hark! the bell in Magdalen Tower is calling to prayer as the sun sinks to rest.

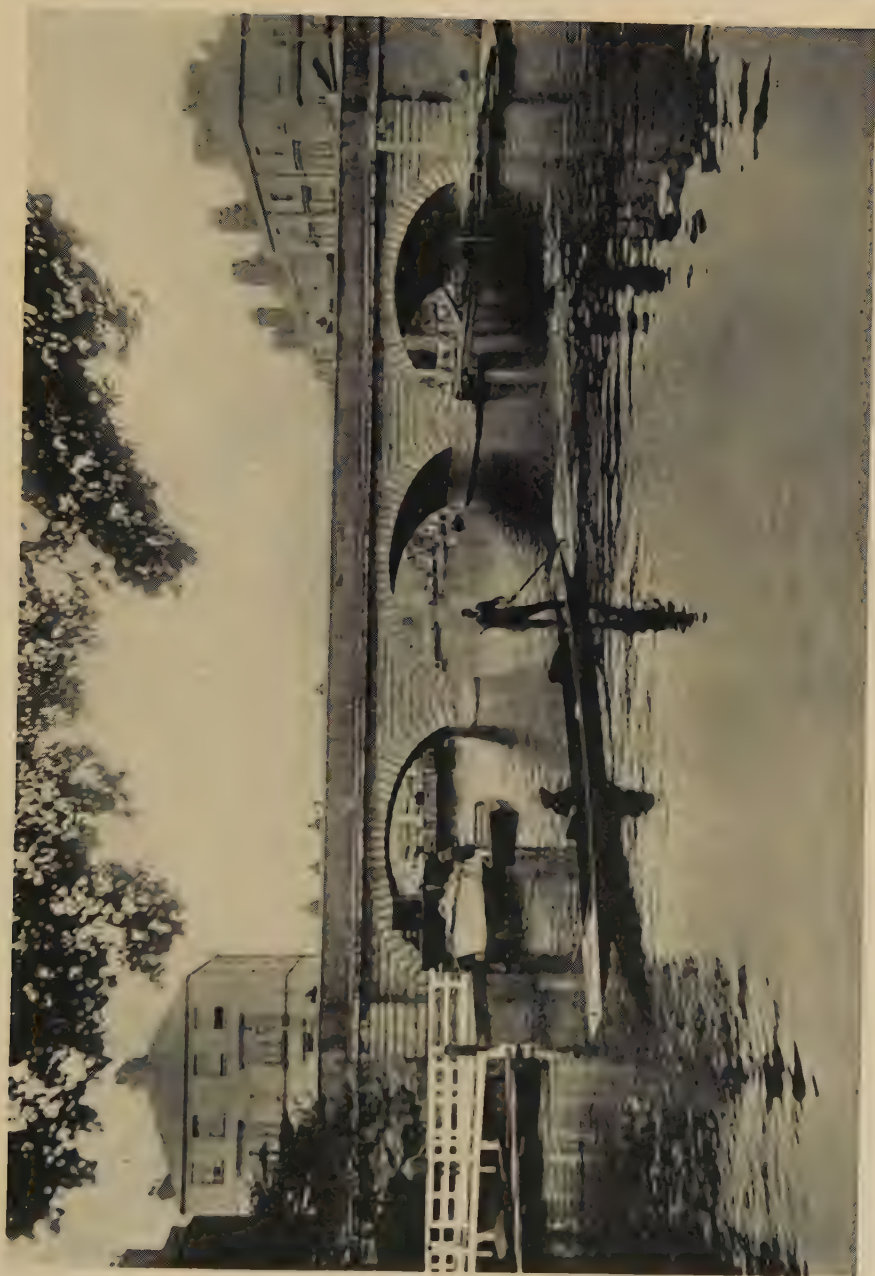


FIG. 37. FOLLY BRIDGE, OXFORD

STEEL ARCH BRIDGE, NIAGARA

SCARCELY seventy-five years ago John A. Roebling built the first bridge over the Niagara River below the falls. Now there are three bridges. He first stiffened trusses—rods bound together in a rigid frame. Experience taught him a better way, and later he used wire ropes made in his own factory at Pittsburgh. These wire ropes soon replaced stiffened trusses and chain cables.

The Niagara is unlike other rivers, for it has no valley. Its water pours out of Lake Erie and flows due north over a belt of land lying in two planes, upper and lower. These planes are separated about midway by a high cliff or escarpment facing Lake Ontario on the north. The cliff of hard limestone forms a brink over which the cataract plunges into a deep pool worn in the soft shale. One of the chief attractions of Niagara Falls is its crystal-clear, sparkling water, every drop a prism reflecting and refracting each ray of light. The American fall is 164 feet high.

The Niagara Bridge, built by John A. Roebling in 1852-55, was rebuilt in 1896-97. It is a steel-arch bridge,—one long central arch and a short one at each end. At that time it was the longest bridge of its kind in the world, having a span of 1240 feet. The bridge carries a double-track electric tramway, a double carriage roadway, and a footpath.

From the Steel Arch Bridge we have magnificent views of the falls in its many moods as the seasons come and go. Then, too, under the bridge the racing water flees from the whirlpool and rapids as though some mighty monster were in pursuit. Marvelous are the feats this restless river performs in its thirty-two-mile journey from lake to lake, besides the wild leap it took when, losing its balance at the cliff, it tumbled headlong into the depth below. We need to study the wonderful bridge summer and winter in order to understand what it endures in accommodating itself to the whims of wind, water, and weather. Thus only shall we appreciate how great was the genius of the engineer.



Photo from International News Reel Co.

FIG. 38. STEEL ARCH BRIDGE, NIAGARA

PUENTE DE ALCANTARA, TOLEDO, SPAIN

TOLEDO is set upon a hill. Its houses creep up the sides, plant their feet among the rocks, and hang on for dear life. Around the hill flows the river Tagus and across its turbulent waters are two of the most picturesque bridges in christendom—Puente de Alcántara and Puente de San Martin.

The older one, Puente de Alcántara, was built in Roman times, was repaired by the Goths in 687, and rebuilt by the Moors in 866. Unfortunately the bridge was destroyed four hundred years later, but it was again rebuilt. Nearly every hundred years since then the bridge has been made over, and often a distinctive feature has been added. Once there came a terrific deluge which lasted five months. But with all the agents of man and nature working against it enough remains of its original wild beauty to delight our sense of the picturesque.

Almost opposite the Alcántara Bridge, across the Tagus on the west, is the Puente de San Martin, built in 1212. Its huge gate-towers and five arches, the center one over a hundred feet high, add an imposing and rugged feature to Toledo's wild surroundings. An interesting story is connected with the building of this bridge. When the architect had finished his work and was ready to take down the scaffolding, he found to his horror he had made a mistake in his calculations: the central arch was defective. The arches would not hold the structure. Heartbroken, he told his wife of his discovery. She, good woman that she was, cheered him, saying: "All will come out right. You go to sleep like a good boy!" Which he did.

But the good wife did not go to sleep. She knew that her husband was ruined if the archbishop should learn of his carelessness. She slipped out of the house at midnight, went to the bridge, and set fire to the woodwork. Every one thought it an accident that the bridge was burned. The architect again made the arch and the stones fitted together exactly. Were they happy? The husband was, but his wife was very unhappy. At last she went to the archbishop and confessed. But instead of condemning her the archbishop laughed heartily and congratulated the architect on having such a clever wife. Then he ordered a statue of her carved on the keystone. Possibly it is her likeness we see there to-day.



Photo from William Thompson

FIG. 39. PUENTE DE ALCANTARA, TOLEDO, SPAIN

BRIDGE OF BOILS, PERU

NEVER in the history of railroading has there been a more spectacular railroad put through than the Peruvian Central Railroad of South America. Every mile of the road pushing its way through the Andes Mountains was built under great difficulties.

One section, from Lima to Oroya, seemed almost beyond human achievement. The men employed were ex-sailors from the United States. Their training in mounting dizzy heights in terrific winds, hailstorms, and pouring rains gave them a physical command of their minds and bodies that reduced to the minimum death from accident. But they could not stand up under a scourge of disease. A plague broke out which cut them down like armies being gassed. The disease was said to come from decomposition of the soil. The contagion swept through the army of workers. The warnings were a fever, great thirst, pains in the back, then boils, boils, boils breaking into one another.

This plague broke out while the men were building the bridge across a yawning chasm, six hundred feet wide. No wonder that it was named the "Boil Bridge"; in Spanish, Puente de las Verrugas. The bridge rests on three gigantic piers. Before the railroad was finished more than seven thousand lives were sacrificed to the work.

Even in the time of the Incas, ancient lords of the land, as early as the thirteenth century, a bridge crossed this chasm. Cables were made of llama hide, stretched taut. Baskets were towed back and forth with hide ropes. This was a true suspension bridge in its primitive form. It was called by the natives the Oroya. Around it grew up the town of Oroya, for some time the terminus of the present Peruvian Central Railroad. Henry Meiggs (1811-77) was the engineer who conceived this eighth wonder of the world. To-day, after more than a half-century of bridge-building, it is considered a marvel of engineering skill. From Oroya the railroad is following the ancient Incas' highway; thus the dream of a Pan-American railroad is being realized.



Photo by Ewing Galloway

FIG. 40. BRIDGE OF BOILS, PERU

VICTORIA BRIDGE, AFRICA

WHAT do you suppose Livingstone said when he first saw the falls of the Zambesi River, in southeast Africa? Just think of nearly a mile of water dropping three hundred and fifty feet and sending spray thousands of feet into the air! A waterfall twice as wide and twice as high as our own Niagara! So far as we know, this great waterfall had never been seen by man until David Livingstone, the Scotch missionary and explorer (1813-73), saw it in 1855. Just when the convulsion of the earth took place that cracked and dropped the bed of the Zambesi River at this point is another of Nature's secrets.

Livingstone was making his way to the east coast when he began to hear a strange low roar in the air. This roar increased as he pushed on, until it became a terrific bombardment of sound, and then he found that the cause of it was a waterfall! Surely Livingstone heard God ask of him, as of Job: "Who hath divided a watercourse for the overflowing of waters . . . on the wilderness, wherein there is no man?"

Fifty years later Cecil Rhodes, standing by the falls, said, "Build the bridge where the spray from the falls shall shower upon the trains as they pass." Then he added, "And keep the falls in full view!" And the engineers did. Fittingly this great pathway over the largest river in Africa is named—as are the great falls—for England's best-loved queen, Victoria. The bridge, made in England, was set in place over the Zambesi River in a year's time. In its construction only two men were killed of the three thousand natives and seven hundred white men employed. It was set up simultaneously on both sides of the river. An electric cable carried the material over the gorge. To instal the cable a rocket was fired across the chasm, to which was attached a line, then a rope, a wire, and a cable. The water in the gorge has never been fathomed.

The Victoria Bridge is a link in the Cape-to-Cairo Railroad, begun by Cecil Rhodes. When the bridge was under construction a huge net was thrown across the chasm. One of the engineers remarked, with a sly wink, "To catch the boys and tools should they inadvertently drop into it."



Photo by Brown Bros.

FIG. 41. VICTORIA BRIDGE, AFRICA

QUEBEC BRIDGE, CANADA

“THE weak link in the chain!” How often we explain failure, whether in boy or girl, great enterprise or wonderful bridge, with this phrase! Never, however, did tiny weak spot bring quicker disaster than in the Quebec Bridge over the St. Lawrence River, on August 29, 1907. Only a few inches of overstrained steel in a curved brace let go, and the nearly finished bridge started July, 1905 crumpled in a heap.

A gang foreman, describing the disaster, told how, on the morning of the collapse, he himself examined the weak brace and, feeling that disaster was near, went to his superior and earnestly said, “I cannot take my gang on the bridge again!” He was scarcely started on other work when the crash came. A hundred and more men went to their death.

Another bridge was started and for nearly ten years the work progressed. In 1916 a suspended span hoisted in mid-air fell into the river, doing much damage. Nevertheless the work went on in spite of the failure of 1907 and the loss of 1916. On September 27, 1917, the Great Cantilever Bridge on the Trans-continental Line of the Canadian Government Railway, near Quebec, was opened for traffic.

A serious problem arose in the sinking of the steel cages or caissons for bridge anchorage and tower foundations. The human body refused to adjust itself to sudden changes in air-pressure. A high air-pressure is necessary for the underground work. The method finally adopted, to guard the workmen from undue strain, is quite simple. This was the method used in building the Quebec Bridge: The engineers built a man-lock, a chamber underground, large enough to hold thirty or forty men. The workmen entered this man-lock when going down to work. The air-pressure in the lock was gradually raised to work-pressure; this took about thirty-five minutes. When the men came from work they again entered the man-lock, at high air-pressure, which was gradually lowered to normal, again taking about a half-hour. Sometimes, workmen later developed “bends”—sharp pains in the body—and had to go through the same air-pressure treatment in a special hospital.



Photo by Ewing Galloway

FIG. 42. QUEBEC BRIDGE, CANADA

DAMASCUS BRIDGE, SYRIA

DAMASCUS has many low stone bridges crossing the river Barada. This river is the same as the Abana of Elisha's time—the ninth century B. C.

That human little story so quaintly told in II Kings, Chapter V, says that Naaman, the great Syrian general, was a leper. Hearing of the prophet Elisha in Palestine, he went to him to be cured. But when the prophet sent a messenger to Naaman, saying, "Go and wash in Jordan seven times," Naaman was wroth, and went away, saying in his impatience, "Are not Abana and Pharpar, rivers of Damascus, better than all the waters of Israel?" But Naaman did wash in the Jordan, "And his flesh came again like unto the flesh of a little child, and he was clean." This story was very real to me as I leaned over the stone parapet of the little Damascus Bridge and looked deep into the clear, sparkling water of the Abana River, where every stone was visible.

The fascination of Damascus, whose beginnings are shrouded in mystery, is that of a marvelous jewel. No wonder that among its various names down the ages were "Eye of the Desert," "Pearl of the Orient," and "Paradise of Earth"! Its gardens are beyond compare: flowers, vines, and fruit-trees set amid crystal waters. If it was founded by the grandson of Noah, as some believe, that grandson knew well that a city set by the rivers from the snow-clad mountains of Lebanon (Lebanon means white) would live to be the oldest city in the world.

No one can be in Damascus and not feel the influence of St. Paul. Just before entering the city we passed a group of men and could easily imagine that Paul was the man on a particular camel. Only I doubt if that man ever heard the startling words, "Saul, Saul, why persecutest thou me?" The street called Straight is a little disappointing; yet we remember that here Ananias sought Paul in the house of Judas and in a very human way put his hands on him and said, "Brother Saul." How happy such a greeting!

When Mohammed the prophet first saw the glorious city of Damascus he turned away his head, that he might not forget Paradise.



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FIG. 43. DAMASCUS BRIDGE, SYRIA

EADS BRIDGE, ST. LOUIS

RIVERS are fickle! The great engineers of the world studied the Mississippi River long and earnestly before the marvelous Eads Bridge was built. Scientific men, gathered in conference, were told over and over that Nature's laws were God's laws and that these laws must be known and obeyed or the bridge would fall.

To bridge the Father of Waters, as the Indians called it—Missi Sepe—was a problem. But when James B. Eads, the chief engineer, got into a diving-bell, in 1867, and went to the bottom of the unruly river, it had to give up some of its secrets. One was about the good ship *America* which had plied on the river and was lost in a terrific flood in 1839, a hundred miles below the mouth of the Ohio River. Years passed. Sailors on the river noticed an island, then a farmer began to work it; cottonwood trees grew up and were cut into cord-wood and sold to the sailors for their river boats. Twenty years passed. Mr. Eads was just compelling the Mississippi to come under control when two floods, almost equaling the deluge in Noah's time, stirred the great waters. The island with its farms, trees, and houses was swept away. The *America* came to light forty feet below low-water mark. Then said Mr. Eads, "We must fasten our piers to bed-rock."

Never was a bridge so buffeted by men and Nature. But neither criticism, tornadoes, nor floods could overcome the man in charge; he had undertaken to bridge the Mississippi, and bridge it he did. The winter of 1873-74 was most severe. Before Christmas, however, a footpath was flung across the river and thousands crossed in spite of cold winds above and angry water below. In June, 1874, the Eads Bridge, the great steel-arch structure, was complete.

Accidents are funny sometimes. One day the inspecting engineer, stepping on a teetering plank, lost his balance. He said, relating the incident: "I thought I was a long time falling ninety feet and that I must roll myself into a ball. I thought I struck bottom and that it took awful long to come to the surface—and I still had my pencil in my hand." He was rescued, changed to dry clothes, and walked into a conference as word was brought that he was drowned.



Photo by Brown Bros.

FIG. 44. EADS BRIDGE, ST. LOUIS

MENAI SUSPENSION BRIDGE, WALES

THE Welsh call their most northern county, projecting into the Irish Sea, *Mon*, the cow. Its real name is Anglesey, Isle of Angles, sometimes spoken of as "Isle of Brave-folk." This small island, low and flat, is divided from Carnarvon County by the Menai Strait. Over this narrow strip of water, only thirteen miles long, are two of the most famous bridges of the nineteenth century. When Thomas Telford (1757-1834) finished Menai Bridge he gave mankind one of the most graceful of suspension bridges.

Telford, the son of a shepherd in the south of Scotland, grew up among the sheep. When he was fifteen his father bound him out to a stone-mason. From this time his education came in snatches, but it came. A letter in rhyme which he wrote to Robert Burns is shown with great pride. Step by step he climbed upward in the engineering profession, first building small houses, repairing castles, and helping to build Somerset House. Then he became a canal- and road-projector and bridge-builder, and he capped the climax of his achievements with the Menai Bridge of 1820 and the Conway Bridge of 1822.

The Menai Bridge is unique, for in it Telford overcame "flexibility," the weakness of suspension bridges. His method was simple. He made the dead weight of the bridge exceed the live weight (the moving weight of loads passing over the bridge), thus steadying the structure by its own weight.

All bridges seem susceptible to the marching step of soldiers or any continuous rhythmic movement. You see, bridges have an ear for music, and if the key-note of the bridge is struck, immediately every molecule in the structure begins to quiver. Every object is made up of tiny molecules, and when all the molecules in a bridge quiver in unison the whole bridge sways. Very grave disasters have come from marching armies across bridges. A suspension bridge in Angers, of western France, gave way under marching troops and nearly five hundred soldiers went to their death. Always soldiers break step when crossing a bridge.

A story is told of a wandering musician coming to where men were putting up a stone bridge. The man said laughingly, "I can fiddle your bridge down!" The workmen scoffed at the boast, but the fiddler stepped on the stone-work and began to play, when to their amazement the bridge began to sway.



Photo from Wide World Photos

FIG. 45. MENAI SUSPENSION BRIDGE, WALES

THE DEVIL'S BRIDGE NEAR ANDERMATT, SWITZERLAND

ONE of the wildest scenes in all Switzerland is where the Devil's Bridge or Teufelsbrücke crosses the yawning chasm of the Reuss River. The water, falling in a cascade of one hundred feet, sends a blinding spray over the bridge, while as likely as not the wicked "hat-rogue," wind—the *Hutschelm* of the natives—catches our hats and off they go into the depths below.

The guide in Longfellow's "Golden Legend" says:

Never any bridge but this
Could stand across the wild abyss;
All the rest, of wood or stone,
By the Devil's hand were overthrown.
He toppled crags from the precipice,
And whatsoe'er was built by day
In the night was swept away;
None could stand but this alone.

Finally, in 1830, Abbot Giraldus, out of granite

Built this at last, with a single arch,

* * *

And the Devil promised to let it stand,
Under compact and condition
That the first living thing which crossed
Should be surrendered into his hand . . .

* * *

At length, the bridge being all completed,
The Abbot, standing at its head,
Threw across it a loaf of bread,
Which a hungry dog sprang after,
And the rocks reëchoed with the peals of laughter
To see the Devil thus defeated!

In 1799 two fearful battles were fought at the old bridge. First between the French and the Austrians, when the French sent the Austrians flying. A month later the Russians came on the scene. The French, defending the bridge, tried to blow it up while holding the Russians at bay. But the latter descended into the gorge, crossed the Reuss, and, climbing the steep bank, compelled the French to retire to Lucerne.

For over fifty years both bridges were in place,—the old, twenty feet below the new,—but in 1888 the old one, whose origin is shrouded in mystery, fell into the abyss below.



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FIG. 46. THE DEVIL'S BRIDGE NEAR ANDERMATT, SWITZERLAND

THE OLD NORTH BRIDGE, CONCORD, MASSACHUSETTS

“**A**ND fired the shot heard round the world”! No wonder the Old North Bridge holds the interest of people of every nation. School children learn of it in every country we have visited and in the isles of the sea. It has nothing of beauty or grandeur or size—just a simple stout stone bridge leading from one side of the insignificant Concord River to the other. But on April 19, 1775, a company of farmer-boys—minute-men, ready for service at a minute’s notice—defended that bridge and made possible the most stupendous nation the world has ever known, the United States of America.

We seem to re-act the scene in the Old Manse where Emerson the young minister, grandfather of Ralph Waldo Emerson, wrote the “Narrative” of that battle-day. He says, speaking of the manse he had built, “This had been standing for ten years at the time of the fight.” From one of the western windows of the second floor Phœbe Emerson, his wife, saw the fight in the field by the bridge.

At two o’clock, that morning, Young Prescott rode furiously into Concord, crying, “The king’s troops are coming!” The church bell rang out the alarm. Quickly the minute-men gathered, and for hours, retreating and advancing, they obeyed the special order not to fire unless fired upon, until they crossed the bridge. At ten o’clock the fight began. A hundred of the king’s troops guarded the town side of the bridge. They must be routed. Captain Davis cried, “I have n’t a man that’s afraid to go!” Then came the order from Major Buttrick, “Fire, fellow-soldiers! for God’s sake fire!” This was the end of the fight at the bridge.

The statue of “The Minute Man,” by Daniel Chester French, was cast from ten brass cannons given for the purpose by Congress. On its pedestal are the opening words of Emerson’s hymn, “By the rude bridge that arched the flood,” etc. This bridge is the exact reproduction of the one of 1775.



Photo by Ewing Galloway

FIG. 47.

THE OLD NORTH BRIDGE, CONCORD, MASSACHUSETTS



FIG. 47A. THE MINUTE MAN

DUFFERIN BRIDGE, BENARES, INDIA

THE river Ganges and the city of Benares are sacred to the people of India. The Ganges! Even now I feel goose-flesh rising on me at its name. Such horrible acts have been committed here in the name of the Hindu gods. The river, skirting the west side of the sacred city, has a row of steps leading from the water's edge up into the famous buildings of Benares. Along these steps are thirty most holy halting-places, called ghats. A ghat in Hindu means a mountain pass or special steps down to the water for worship.

The oldest of these steps, the "Old Raj Ghat" at the north end, is where the railroad crosses the Ganges by the Dufferin Bridge, the only usable bridge during the rainy season. A pontoon bridge near by can be used in dry weather, though few ever go over the river into the sandy waste. If a person should die over there the people believe he would be turned into a donkey.

Of the numerous ghats along the river, five stand out as most sacred. Sailing along the city's front early in the morning, we watch thousands of people coming down to bathe and drink. Such a multitude! Sick and well, of every caste, gather here to worship. The stench that rises in the air and the filth that trickles into the sacred water have for centuries been gathering in this holy of holies. Benares was at the height of its glory a thousand years before the birth of Jesus the Christ. A pilgrimage to Benares is to the Hindu what a pilgrimage to Mecca is to the Moslem. Even to-day it is not unusual for a million pilgrims to visit Benares in a year.

In our sail along the river, as we pass shrine after shrine, the burning piles of wood recall Kipling's lines:

And they bear one o'er the field-path, who is past all hope or caring,
To the ghat below the curling wreath of smoke.

The highest honor possible to the Hindu is to be burned on a ghat and have his ashes scattered on the sacred river. What an intruder the modern steel railroad bridge seems among this strange fanatical people! But the Dufferin Bridge, built under the English rule, anchored and steadied by towers planted one hundred feet in the earth, is the only bridge that has ever stood against the floods of the Sacred River. And India will stand anchored by England.



FIG. 48. DUFFERIN BRIDGE, BENARES, INDIA



Courtesy of George H. White

FIG. 48A. THE BURNING GHAT, BENARES

SAINT BENEZET BRIDGE, AVIGNON, FRANCE

LITTLE BENEZET, a shepherd lad of France, lived in the twelfth century. Like Jeanne d'Arc, three hundred years later, he heard mysterious voices calling him. He left his flocks in the far-off mountains and followed the call until he came to Avignon. He went to the bishop, told him he was sent to build a bridge in this "windy city," over the tempestuous waters of the river Rhone. The people laughed. What did a mere child know about bridges! But the bishop, feeling the boy was honest about his mysterious mission, decided to test him. He pointed to a big rock, so heavy a score of men could hardly lift it, and told Bénézet to carry it to the spot where the bridge was to be built. Bénézet, nothing daunted, took the stone in his little arms as though it were one of his lambs and placed it on the spot. The amazed crowd stopped jeering and were ready to worship the wonder-working boy. The bridge was built at once and named "Saint Bénézet's Bridge" in his honor.

One end of Bénézet's Bridge starts near Philippe le Bel's Tower. Only three of the boat-shaped piers and four arches are still in place. As we drive around Avignon and cross a long suspension bridge over the Rhone to a fair-sized island and turn to our right, we see the spot where little Bénézet's bridge was attached to the opposite shore.

Avignon was a Roman city until 1791, when it was attached to France. In the fourteenth century it was the home of seven popes for nearly seventy years (1309-76). The Palace of the Popes in Avignon—a mixture of fortress, convent, and prison—became a favorite place of imprisonment for men and women the court wished to forget. Many crude bits of carving are on the walls, made by the prisoners with their spoons—their only tools. One pathetic couplet reads:

Undertake nothing whose end you have not seen.
Have patience, poor prisoners.

Avignon was the home of Petrarch and Laura, and near by is the Castle of Beaucaire, where dwelt Aucassin, who, according to that wonderful prose tale of the Middle Ages, loved the beautiful captive maid Nicolette.



FIG. 49. SAINT BÉNÉZET BRIDGE, AVIGNON, FRANCE

BEAR MOUNTAIN BRIDGE, NEW YORK

ANTHONY'S NOSE! You see, the nose belonged to a trumpeter named Van Corlear, who sailed the Hudson River. His dress equaled that of a king's, and his nose, because he loved wine, was like a red ruby. One morning, bright and early, Anthony was leaning over the ship's rail, near the promontory opposite Bear Mountain, just as the sun was coming up. Suddenly a powerful sun-ray, striking Anthony's brilliant nose, was reflected in the river. It hissed like hot iron when it touched the water and killed a huge sturgeon passing by. The ship's crew hoisted the great fish on board and they all had a royal feast. When Peter Stuyvesant (1602-82) heard this story, he named the promontory in honor of Anthony's nose.

For ages upon ages the bold, impregnable promontory has been thrusting itself into the Hudson River opposite Bear Mountain as though it longed to touch the lovely blossoms with the delicious perfume on the mountain-side. But no, Anthony's Nose could not reach the blossoms.

Then came the wonder of wonders, the longest suspension bridge in the world! And Bear Mountain and Anthony's Nose, at the narrowest point in the Hudson River between Albany and New York City, touched each other by means of Bear Mountain Bridge, opened on Thanksgiving Day, in 1924. This monster bridge spans the spot where the forged iron chain was stretched across the river in Revolutionary days to keep the British from sailing up the Hudson. It is a traffic toll-bridge under private enterprise. Its great size makes room for four automobiles abreast, two each way, and a sidewalk five feet wide, on each side.

Really to understand the marvelous feat of hanging a bridge one hundred and fifty-five feet in the air from towers, across a third of a mile of water space, we must fix in our minds a few figures. The bridge is carried by two huge cables eighteen inches thick each about a half-mile long. Each cable has seven thousand wires. If these fourteen thousand wires were stretched in a single line starting from the west bridge tower, the line would reach around the Cliff House, San Francisco, and back to the east tower of Bear Mountain Bridge over the Hudson River.



Photo from Wide World Photos

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